BIBLIOGRAPHY OF Technical Reports

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BIBLIOGRAPHY OF Technical Reports

September 4, 1953 Vol. 20, No. 3

CHEMICALS AND ALLIED PRODUCTS

Drugs and Pharmaceuticals

Chemical influences on behavior. Rochester University. Dept. of Psychology. Contract N6ori-126, T. O. I, Project NR144-060. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

II. Development of methods and preliminary results on the effects of some drugs on emotional and social behavior, by Vivian T. Harway, John T. Lanzetta, Helen H. Nowlis, Vincent Nowlis, Austin H. Riesen, G. R. Wendt. Report prepared by A. H. Riesen. Mar 1953. 32p tables Microfilm $2.25, Photostat $5.00. PB 109786

1. Drugs - Psychological effects.

III. The effects of dramanine and scopolamine on emotional and social behavior with comparison data on the effects of other drugs, by Helen H. Howlis, Vincent Nowlis, Austin H. Riesen, G. R. Wendt. Report prepared by Vincent Nowlis and Helen H. Nowlis. Mar 1953. 42p tables Microfilm $2.50, Photostat $6.25. PB 109787

1. Drugs - Psychological effects 2. Dramanine - Psychological effects 3. Scopolamine - Psychological effects.

Dextran - a selected bibliography: Chemical, microbiological, clinical and related publications of interest in the use of dextran as a synthetic blood volume expander, by Allene Jeanes with the assistance of Louise Huntsinger and Nellie G. Larson. U. S. Bureau of Agricultural and Industrial Chemistry, Northern Regional Research Laboratory, Peoria, Ill. Jun 1952. 42p Available from U. S. Dept. of Agriculture, Bureau of Agricultural and Industrial Chemistry, Northern Regional Research Laboratory, Peoria, Ill. PB 109741

1. Dextrans - Bibliography 2. Blood - Volume - Synthetic expanders 3. Blood plasma - Substitutes 4. AIC 288, Revised.

Preparation of some tetrahydroquinoline derivatives, by Winston W. Fike. Jun 1950. 89p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 109826

The procedures used and the results obtained in the synthetic work are described, as well as preparation of the intermediates used in the work and the chemistry of the reactions. Thesis-Rensselaer Polytechnic Institute.

Plastics and Plasticizers

Expanded, mono-cellular polyvinyl chloride. Interim report by Donald S. Greif. U. S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Mar 1953. 6p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109771

Project 4-93-13-001.
1. Packaging materials - Tests 2. Polyvinyl chloride - Plasticizers 3. Polyvinyl chloride - Viscosity - Tests 4. Plastics - Materials 5. Foams, Plastic 6. CC CRL R 66.

Paints, Varnishes and Lacquers

Preliminary investigation of suspensions of titanium dioxide in mineral oil, by Edwin W. Daley.

Jun 1950. 47p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109821

The data collected in this thesis investigation might find some application in the paint industry. The additives that were eventually used in this study were oleic acid and an anine soap, di-n-butylanine monooleate. Results are tabulated and plotted in the study of the behavior of pure oil and suspensions, the effect of oleic acid, anine soap in 5% titanium dioxide, and anine soap in 10# titanium dioxide. Thesis-Rensselaer Polytechnic Institute.

Ordnance Chemicals

Notes on the determination of nitrocellulose viscosity, by E. D. Margolin and C. J. Blue. U. S. Naval Powder Factory. Research Development Dept., Indian Head, Md. Feb 1953. 13p photos, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109791

It is shown that nitrocellulose viscosity samples can be prepared volumetrically. A clamp is adapted for the viscosimeter assembly. NPF MR31.

Miscellaneous Chemicals

Frictional behavior of polyethylene, polytetrafluoroethylene, and halogenated derivatives, by R. C. Bowers, W. C. Clinton, and W. A. Zisman. U. S. Naval Research Laboratory. May 1953. 23p photos, drawing, graphs, tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 111185

The static and kinetic frictional properties of a group of unplasticized linear high polymers and copolymers have been investigated in a Bowden-Leben "stick-slip" machine. Friction measurements were made for steel sliding on polymer, polymer on polymer, and polymer on steel, with two types of polymer surfaces. NRL R4167.

Investigation of the reactivities of certain amino and imino-compounds by means of infrared spectra, by Mason H. Earing. Jun 1950. 111p diagr, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $4.75, Photostat $15.00. PB 109823

The two major considerations of the investigation were the determination of the relative proton-attracting powers of ketimines by the measurement of their ability to form hydrogen bonds; and the determination of the infrared spectra of both the ketimine bases and the corresponding salts in the hope of correlating differences in the spectra with the relative reactivity of the compounds. Thesis-Rensselaer Polytechnic Institute.

Preparation of n-heterocyclic ethanol and n-vinyl heterocyclic compounds from ethanolamine and alkyl dichlorides, by Steven Abashian. Jan 1950. 38p table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109833

An investigation was made to prepare N-heterocyclic ethanol compounds by the cyclo-dehydrohalogenation of alkyl dichlorides with ethanolamine, and to dehydrate these compounds to obtain the corresponding N-vinyl heterocyclic compounds. Three heterocyclic ethanol compounds, 1-piperidine-ethanol, 4-morpholine-ethanol, and 1,4 diperazinediethanol, were prepared by the reaction of ethanolamine and 1,5 dichloropentane, $\beta\,\beta'$ dichloroethylether and ethylene dichloride, respectively. Thesis-Rensselaer Polytechnic Institute.

Pyrolysis and chlorinolysis of some perchlorinated unsaturated compounds, by John A. Krynitsky and Homer W. Carhart. U. S. Naval Research Laboratory. Jun 1949. 24p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 109860

Six perchlorinated unsaturated compounds were subjected in the dark to liquid and vapor-phase pyrolysis and to the action of chlorine at temperatures up to 500°C. The kinds and amounts of products are summarized, mechanisms for the reactions are discussed, some potential uses for perchlorinated unsaturated compounds are suggested, and tables of physical properties are given. NRL C-3468.

Stoichiometry of the reaction between oxygen and hexaphenylethane, by Norman N. Lichtin and George R. Thomas. Boston University. Chemistry Dept., Boston, Mass. n.d. 34p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109905

The dependance of the stoichiometry of the reactions between hexaphenylethane and oxygen upon solvent, temperature, oxygen pressure and state of solution of the ethane has been investigated with a twofold purpose: (1) evaluation of the application of this reaction to the quantitative analysis of hexaphenylethane and (2) assembly of new information concerning the nature of the reaction between these substances. A plausible reaction scheme involving attack of tritylperoxy radicals on the solvent is presented. Scientific report no. 3 under Contract no. AF19 (122)-405.

Superconductivity studies, by W. T. Ziegler and R. A. Young. Georgia Institute of Technology. State Engineering Experiment Station, Atlanta, Ga. Jun 1953. 23p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109909

Technical report no. 4. Contract no. N6-ori-192, T. O. I, NR016-406. Project no. 116-118. Includes the following reprints: Crystal structure and superconductivity of lanthanum, by W. T. Ziegler, R. A. Young and A. L. Floyd, Jr. (From Journal of American Chemical Society, vol. 75, p. 1215-1221 (1952) - Studies of compounds for superconductivity, by W. T. Ziegler and R. A. Young (From Physical review, vol. 90, p. 115-119 (1953) - Crystal structure of lanthanum nitride, by R. A. Young and W. T. Ziegler (Journal of American Chemical Society, vol. 74, p. 5251-5253 (1952).

Synergistic effect in antifoaming agents, by Alan F. Hughes. May 1951. 26p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109817

Mixtures of tributyl phosphate and methyl isobutyl carbinol were used as antifoaming agents on a foaming system containing 0.50% nacconol NRSF and 0.75% sodium silicate. Values of liquid life, gas live, foam life, initial density and limiting density were determined.

Synthesis of methyl trifluoromethacrylate, by A. Eugene Corey. Jun 1950. 23p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109824

Experimental methods used in the synthesis of trifluoroacetone and subsequent transformation of trifluoroacetone to methyl trifluoromethacrylate are described. Trifluoroacetone can be prepared by acetoacetic ester condensation involving ethyl acetate and ethyl trifluoroacetate followed by a ketonic hydrolysis of the product. Monomer methyl trifluoromethacrylate was produced by action of sulfuric acid and methanol on trifluoroacetate cyanohydrin. Thesis-Rensselaer Polytechnic Institute.

DETERIORATION STUDIES

Supertropical bleach: Summary of work by plants division C and R. L, by William D. Mohr. U. S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Apr 1953. 16p diagr, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109772

Project 4-92-03-011.
1. STB (Supertropical bleach) 2. Tropical deterioration - Prevention 3. Powders, Bleaching - Tropical deterioration - Prevention 4. CC CRL R 156.

ELECTRICAL MACHINERY

Communication Equipment

Crystal limiter for use in an FM receiver in the presence of impulse interference, by T. P. Cheatham. Massachusetts Institute of Technology. Research Laboratory of Electronics. Apr 1947. 11p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109966

An analysis of impulse noise in an ideal (amplitude insensitive) FM receiver has indicated that the effect of impulse noise should be negligible. From the analysis additional transient functions of a limiter are inferred. These functions are shown to be approximated by two germanium crystals paralleled with reversed polarities. Experimental results are shown in the form of oscillograms. Contract W36-039-sc-32037. MIT RLE TR36.

Multipath phenomena and their effect on communication systems, by Andrew Alford. Under Contract no. W19-122-ac-27. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

Report no. 1. Sep 1948. 38p diagrs, graphs (part fold) Micorfilm $2.25, Photostat $5.00. PB 109922

1. Radio interference - Research 2. Radio transmission, Multichannel 3. Communication systems.

Preport no. 3. Jun 1951. 21p diagrs Microfilm $2.00, Photostat $3.75. PB 109923

1. Radio interference - Research 2. Radio transmission, Multichannel 3. Communication systems.

Signal-to-noise in communications. Williams College, Williamstown, Mass. Under Contract no. W19-122-ac-39. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

Report no. 1 for period Jun 1-Sep 1, 1948, by Alfred G. Emslie. Oct 1948. 25p Microfilm $2.00, Photostat $3.75. PB 109931

The object of the report is to compare the noise levels of radio receivers, thermal detectors and photocells, from the communications point of view.

First a summary of results on static, stellar noise and man-made noise is given, and it is concluded that these forms of noise set the limit for frequencies up to 100 mc/s. The effect of optically matching a thermocouple or photocell is discussed. A general formula for received thermal radiation noise is derived and it is applied to radio, infrared and optical receivers.

Report no. 2. for period Sep 1-Dec 1, 1948, by Alfred G. Emslie. Feb 1949. 15p diagrs, table Microfilm $1.75, Photostat $2.50. PB 109932

The report deals mainly with non-coherent integration. A summary is given of the methods used in radar and of the results obtained. Then the general problem of integration is discussed in terms of the information diagram, using Gabor's method of resolution into elementary Gaussian signals. Coherent and non-coherent integration are defined and the case of non-coherent integration is then considered in more detail.

Report no. 3 for period Dec 1, 1948-Apr 1, 1949, by Alfred G. Emslie. Mar 1949. 16p diagrs, table Microfilm $1.75, Photostat $2.50. PB 109933

This report is concerned with the effect of coherent integration on signal-to-noise ratio. The problem is discussed in terms of elementary signals on the information diagram.

Electronics

Delay-line for use as a dummy load of high power rating, by Helmut Brueckmann. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Jan 1953. 28p photo, darwings, diagr, graphs (part fold), tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109704

The dummy load described in this report consists fundamentally of stainless steel wire wound in a helix of uniform diameter and pitch which is supported by a coaxial ceramic form and shielded by a metal tube. This helix acts as a uniform transmission line with relatively high inductance and capacitance per unit length and therefore, low propagation velocity, similar to a delay line, and with relatively high attenuation. Dept. of the Army project no. 3-99-12-021. Signal Corps project no. 132A. SCEL TM M-1482.

Effects of the geometry of piezoelectric crystal plates. Tufts College. Dept. of Physics. Research Laboratory of Physical Electronics, Medford, Mass. Under Contract no. W36-039-sc-32379. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

Sixth quarterly report. Apr 1948. 37p diagrs Microfilm $2.25, Photostat $5.00. PB 109693

1. Crystals, Piezoelectric - Vibration - Mathematical analysis 2. Crystals, Piezoelectric - Research 3. Crystals, Piezoelectric - Structure.

Seventh quarterly report. Jun 1948. 188p photos, diagrs, graphs, tables Microfilm $6.75, Photostat $23.75. PB 109694

1. Crystals, Piezoelectric - Vibration - Mathematical analysis 2. Crystals, Piezoelectric - Research 3. Crystals, Tourmaline - Temperature coefficients 4. Bridges, Impedance - Design.

Eighth quarterly report. Sep 1948. 76p photos, diagrs, tables Microfilm $3.50, Photostat $10.00. PB 109695

1. Crystals, Piezoelectric - Vibration - Mathematical analysis 2. Crystals, Piezoelectric - Research 3. Bridges, Impedance - Design.

Ninth quarterly report. Dec 1948. 153p photos, diagrs, graphs, tables Microfilm $6.00, Photostat $20.00. PB 109696

1. Crystals, Piezoelectric - Research 2. Crystals, Piezoelectric - Vibration - Mathematical analysis 3. Fourier analysis 4. Spectrometers, Crystal - Design 5. Bridges, Impedance - Design 6. Micromanipulators - Design.

Tenth quarterly report. Mar 1949. 179p photos, diagrs, graphs, tables Microfilm $6.50, Photostat $22.50. PB 109697

Dept. of the Army project no. 3-99-11-022. Signal Corps project no. 142B.
1. Crystals, Piezoelectric - Research 2. Crystals, Piezoelectric - Electrical properties - Measuring equipment. 3. Crystals, Piezoelectric - Vibration - Mathematical analysis 4. Instruments, Measuring - Electrical 5. High frequencies - Research.

Eleventh interim report, by Charles R. Mingins. Sep 1949. 82p photos, diagrs, tables Microfilm $3.75, Photostat $11.25. PB 109698

Dept. of the Army project no. 3-99-11-022. Signal Corps project no. 142B.
1. Crystals, Piezoelectric - Research 2. Crystals, Piezoelectric - Vibration - Mathematical analysis,

Twelfth interim report, by Charles R. Mingins. Dec 1949. 44p photo, diagrs, tables Microfilm $2.50, Photostat $6.25. PB 109699

Dept. of the Army project no. 3-99-11-022. Signal Corps project no. 142B.
1. Crystals, Piezoelectric - Research 2. Crystals, Piezoelectric - Vibration - Mathematical analysis 3. Spectrometers, Crystal - Uses.

Final report, by Charles R. Mingins. Jun 1950. 147p photos, diagrs, graphs, tables Microfilm $5.75, Photostat $18.75. PB 109700

Dept. of the Army project no. 3-99-11-022. Signal Corps project no. 142B.
1. Crystals, Piezoelectric - Research 2. Crystals, Piezoelectric - Vibration - Mathematical analysis

3. Crystals, Piezoelectric - Structure 4. Spectrometers, Crystal - Design 5. Micromanipulators - Design 6. Bridges, Impedance - Design 7. Laboratories, Electronic - Equipment.

Electromagnetic wave propagation on helical conductors, by Samuel Sensiper. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1951. 122p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $5.00, Photostat $16.25. PB 109631

The results of a theoretical investigation of the properties of the natural waves or "free modes" which propagate along infinite helical conductors are reported. The sheath model which replaces the helix by an anisotropic cylindrical sheet is considered. The higher modes are investigated, and it is found that several waves per mode can exist. The significance of these waves in terms of inward and outward traveling waves from a source is shown. The manner in which the characteristics of these waves change as the parameters of the system are altered is discussed. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102 B-O. MIT RLE TR194.

Electromagnetic waves in iris-loaded waveguides, by J. C. Slater. Massachusetts Institute of Technology. Research Laboratory of Electronics. Sep 1947. 19p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109973

Wave propagation in a cylindrical waveguide loaded by equally spaced irises with circular holes is discussed in two steps: (1) An equivalent circuit consisting of equally spaced capacities shunting a continuous transmission line. (2) An approximate solution of Maxwell's equations is constructed for the π -mode. In a final section, a perturbation method is applied to finding the correction for finite iris thickness. Contract W36-039-sc-32037. MIT RLE TR48.

Experimental and theoretical impedances and admittances of center-driven antennas, by Phyllis A. Kennedy and Ronold King. Harvard University. Cruft Laboratory. Apr 1953. 111p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $4.75, Photostat $15.00. PB 109588

Recent experimental and theoretical results pertaining to the impedance and admittance of center-driven antennas have been consolidated into one report. A complete set of tables and curves with instructions for their use follows a general discussion of the problem. The essentials of the King-Middleton Second-Order Theory and the final equation for the second-order impedance are presented along with necessary spacing and end-effect corrections which must be considered. Experimental results from various sources have been compared with theory. Special related topics such as the electrically short antenna and the receiving antenna have also been discussed. Contract N5ori-76, Task order no. 1, NR-078-011. HU CL TR155.

Factors affecting speech intelligibility in aircraft control towers, by J. C. Webster and P. O. Thompson. U. S. Naval Electronics Laboratory, San Diego, Calif. Mar 1953. 28p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109606

Noise, intelligibility of signal, and operator fatigue were studied as they affect control-tower operations. Two different mock control towers were constructed in which licensed CAA and Navy air-controllers were tested for the ability to discern the words of standard multiple-choice word listings. The words were incorporated into standard aircraft-control-tower phraseologies the transmissions of which were controlled in order to measure the factors affecting speech intelligibility. NELS R357.

Feedback theory. I: Some properties of signal flow graphs, by Samuel J. Mason. Massachusetts Institute of Technology. Research Laboratory of Electronics. Feb 1953. 26p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109668

The equations characterizing a systems problem may be expressed as a network of directed branches. A study of the topological properties of such graphs leads to techniques which have proven useful, both for the discussion of the general theory of feedback and for the solution of practical analysis problems. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102 B-O. MIT RLE TR153.

High-frequency electrical breakdown of gases, by W. P. Allis and Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. Apr 1952. 14p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109632

Previous theoretical treatments of high-frequency electrical breakdown in gases, based on the Boltzmann transport equation, were applied to specific gases and met with mathematical difficulties when applied to higher pressures. This report presents a simpler solution applicable to any gas and to a wide pressure range. Agreement between theory and experiment with hydrogen gives confidence that the energy distribution function is correct, and the distribution function is therefore used to compute other quantities of physical interest. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102 B-O. MIT RLE TR229.

High temperature miniaturized capacitors. Eighth progress report, period ending Dec 27, 1951, under Contract no. AF-33(038)-3928. Sprague Electric Co., North Adams, Mass. Jan 1952. 32p graphs, tables (1 fold) Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109765

During the period covered by this progress report a considerable advance was made in the preparation of tantalum coated ceramic particles with subsequent sintering into a porous anode structure. Details are given of the process steps with many limitations being established. Study of improved high-temperature electrolytes was continued with a number of combinations being measured at temperatures up to 200°C. Additional work was conducted on the assembly of complete high-voltage tantalum capacitors using treated foil anodes with various spacers.

High voltage breakdown due to field emission processes, by Daniel H. Goodman. California. University. Div. of Electrical Engineering. Electronics Research Laboratory. Microwave Tube Group, Berkeley, Calif. Feb 1953. 53p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 109670

Contracts W-33-038-ac-16649 and W-19-122-ac-38. 1. Dielectrics - Breakdown theory 2. Electrons - Emission 3. Electrodes, Metal - Tests 4. UC IER ML TR62.

Influence of surround on tracking performance, Part 1: Tracking on combined pursuit and compensatory one-dimensional tasks with and without a structured surround, by John W. Senders. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1953. 17p diagrs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109773

Four groups of subjects performed a series of tracking tasks on two different target courses and under two conditions of surround illumination. The tasks were varied from pure compensatory to pure pursuit (following) tracking. In general, performance was superior with either surround illumination with a 50 or higher percent of pursuit component. However, the interactions between target course rates, surround illumination, and percent pursuit component in the task are large and complex. Collection of data performed by Antioch College under Contract AF 18 (600)-50. AAF WADC TR 52-229.

Investigation of obstacle type artificial dielectrics, by Charles Süsskind. Yale University. Dunham Laboratory of Electrical Engineering, New Haven, Conn. Under Research and Development Contract no. AF19(122)-270. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

Quarterly progress report no. 1. Sep 1950. 17p diagrs Microfilm $1.75, Photostat $2.50. PB 109918

1. Dielectrics, Artificial - Theory 2. Dielectrics, Artificial - Refractive index.

Quarterly progress report no. 2. Dec 1950. 14p diagrs Microfilm $1.75, Photostat $2.50. PB 109919

1. Dielectrics, Artificial - Theory 2. Waves, Electromagnetic - Reflection - Interference 3. Cylinders - Reflective effect 4. Spheres - Reflective effects 5. Plotters, Radiation.

Quarterly progress report no. 3. Mar 1951. 17p diagrs Microfilm $1.75, Photostat $2.50. PB 109920

1. Dielectrics, Artificial - Theory 2. Dielectrics, Artificial - Refractive index 3. Waves, Electromagnetic - Reflection - Interference.

Final report. Jun 1951. 69p photos, diagrs, graphs, tables Microfilm $2.00, Photostat $8.75. PB 109921

The theory of obstacle-type artificial dielectrics has been reviewed by analogy with classical molecular theory, and also with the aid of scattering considerations. In addition, a preliminary attempt has been made to correlate these analytical methods with the transmission-line analysis. Two specific problems have been considered in some detail. A field plotter developed in the course of this investigation and utilizing a new method of displaying the recorded plots and patterns is presented in the Appendix.

Models SOa/SO-1/SO-13 radar equipment. Contract NXss-15362. Manufacturing drawings fr. 696 thru 1475, photographed by Raytheon Mfg. Co., Waltham, Mass. U. S. Bureau of Ships. Jul 1951. 924f drawings Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $9.00, Enlargement Print $121.25. PB 109730

1. SOa/SO-1/SO-13 (Radar) 2. Radar equipment - Design 3. Raytheon Manufacturing Co., Waltham, Mass. 4. Micro NAVSHIPS D7131.

New microwave reflector, by K. S. Kelleher and H. H. Hibbs. U. S. Naval Research Laboratory. May 1953. 21p Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 111178

A reflector which is useful for applications involving the scanning of a microwave beam through a plane in space has been developed. It is formed as a surface of revolution whose generating element is a parabola. The axis of revolution is a line parallel to the latus rectum of the parabola and is placed at a distance of about two focal lengths from the parabola vertex. The feed horn used to energize the reflector is rotated on an arc of a circle with center at the axis of revolution and with radius approximately equal to a focal length. There are two basic types of this reflector, one used for wide-angle scanning and the other for medium-angle scanning. Pattern

characteristics of both types are shown and compared to existing reflectors. NRL R4141.

On the diffraction of electromagnetic waves by annular, elliptical and rectangular apertures, by Chaang Huang. Harvard University. Cruft Laboratory. Feb 1953. 48p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109575

The derivation of a Kirchhoff-type approximation to the transmission coefficient of an aperture in an infinitely extended, perfectly conducting plane screen of infinitesimal thickness with an incident plane electromagnetic wave, as given by Levine and Schwinger, is briefly recapitulated. The resulting integral formula involves only the tangential component of the aperture magnetic field; this is shown to be equal to the tangential component of the magnetic field of the known, incident wave. Using this formula, the approximate transmission coefficients of annular, elliptical, and rectangular apertures are evaluated for normal incidence. Results have been computed and plotted for appropriate dimensions of each aperture. Contract N5ori-76, Task order no. 1, NR-078-011. HU CL TR 163.

Radar Mark 8 precision sweep and change of bearing lines. Final report, by A. C. Grosvenor. U. S. Naval Research Laboratory. Feb 1945. 17p photos Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109523

1. Mark 8 (Radar) 2. Radar equipment - Tests 3. Oscillators, Sweep - Tests 4. NRL R-2461.

Storage of signals in noise, by W. J. Cunningham. Yale University. Dunham Laboratory of Electrical Engineering, New Haven, Conn. Under Contract W19-122-ac-10. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

Report no. 1, period Jun 1-Aug 3p, 1948. Sep 1948. 21p diagrs, graphs Microfilm $2.00, Photostat $3.75. PB 109915

This investigation is concerned with a device to aid in recognizing the presence of a signal in a communication system when that signal is obscured by random noise. The device takes the form of an element which stores, or integrates, energy from the signal, making use of some characteristic of the signal which differs from the noise. A system has been set up in which the same element serves both as the filter and as the control for the repetition frequency of the pulses at the transmitter.

Report no. 4, period May 1-Jun 1, 1949. Jun 1949. 3p Microfilm $1.25, Photostat $1.25. PB 109916

A radar-signal integrator of the narrow-band type, and having considerable flexibility, is being designed and constructed. A tuned amplifier and the timing circuits for the integration system are currently being studied.

Report no. 6, period Sep 1, 1949-Feb 1, 1950. 71p diagrs (part fold), graphs, tables Microfilm $3.50, Photostat $10.00. PB 109917

A signal integrator has been developed for use with existing radar systems. The integrator consists of a filter following the video amplifier of the radar receiver. The filter has a very narrow pass band, and is designed to transmit only the fundamental component of the signal pulses. The apparatus is designed to be sufficiently flexible to allow its use with many radar systems. Descriptions, circuit diagrams, operating instructions, and other data concerning the integrator are presented in this report.

Tests on TDY-1a antenna, by C. Domenicali and M. Sheppard. U. S. Naval Research Laboratory. Feb 1945. 12p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109525

1. TDY-1a (Antenna) 2. Polarization, Elliptical 3. Antennas - Polar diagrams 4. Antennas - Radiation patterns 5. NRL R-2448.

Thermal insulation and corrosion protection of rangefinders, by James S. Strong, Irving J. Eggert and Harry W. Stewart. U. S. Naval Research Laboratory. Oct 1945. 27p photos, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 109502

This report describes the results obtained by measuring the temperature of various regions of a Mark 65 rangefinder when exposed to the sun. There were three instruments used in the work; one was stripped of its lagging and painted ocean gray, the second was also stripped of lagging but covered with one-quarter inch sponge rubber, and third was kept as a standard for comparison. There were only very small differences in the rates of temperature rise between the three rangefinders, and on the basis of these data the necessity for the use of lagging is questioned for the Mark 65 in particular if not for all other types of rangefinders. NRL P-2663.

Ultrasonic velocity and absorption in liquid helium, by John R. Pellam and Charles F. Squire. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1947. 17p drawing, diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109971

Measurements are given on the velocity and attenuation of ultrasonic energy in liquid helium at a

frequency of 15 Mc/sec as a function of temperature from 1.57°K to 4.5°K. The attenuation measurements exhibit three important features: a) in the upper temperature range of He I the measurements agree very well with classical theory, b) at the λ -point the attenuation coefficient rises abruptly, presumably to infinity, indicating complete absorption of the ultrasonic energy, c) just below the λ - point the attenuation has its smallest value and with lowering temperature the attenuation increases. Contract W36-039-sc-32037. MIT RLE TR44.

Generators, Motors, Transmission

Electronically regulated transistor power supply, by J. P. Mammola. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Research Shops Division, Cambridge, Mass. Apr 1953. 7p photos, diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109906

1. Transistors - Power supplies 2. Power supplies, Electronic 3. AAF CRC TR 53-12.

High speed transistor flip-flops, by A. William Carlson. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate, Cambridge, Mass. Jun 1953. 22p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109908

1. Transistors - Circuits - Design 2. Circuits, Trigger - Design 3. AAF CRL E5098 4. AAF CRC TR 53-16.

Series peaking transformer, a current-zero trigger source, by L. D. Breetz. U. S. Naval Research Laboratory. Mar 1948. 13p photos, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109749

Report of theory of series peaking transformer, derivation of design equations, considerations in practical design work, and manufacture of transformer core from insulating and winding through heat treating. NRL R3258.

Miscellaneous

Current and temperature rise in aircraft cables. Part III: Continuous current capacity of cables in bundles composed of one or more cable sizes, by M. Schach and L. D. Schroeder. U. S. Naval Research Laboratory. Apr 1953. 31p diagrs (part fold), graphs, tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.00. PB 111179

Analysis of the heat dissipated in uniform bundles (bundles composed of cables of a single size) shows that: (1) the allowable heat dissipation density is primarily a function of the cross-section area of the insulation and conductor of the constituent cables, and (2) a minimum curve of heat dissipation density versus area can be established. The minimum curve will correspond to the uniform bundles of the smallest cable size, provided only that the insulation thickness of the individual cables is a constant or varies only slightly over the range of conductor sizes. The allowable heat dissipation density of bundles composed of cables of more than one size lies on or above the minimum power density curve for uniform bundles. A cable-selection and cable-rating chart incorporating the maximum allowable heat dissipation density curve has been devised to give a simple graphical solution for any bundle of currents or cables. This investigation has been confined to rating cables for direct current. The application of the method to rating cables for alternating currents will depend primarily on how much the effective resistance of each conductor will vary as a result of the different possible proximity effects. NRL R4142.

Determination of safe creepage distances for electrical equipment at high altitudes, by Norton M. Hintz and Lloyd J. Money. U. S. Naval Research Laboratory. Mar 1946. 37p diagrs, drawings, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109500

Safe creepage distances were determined for a number of different electrode sizes and shapes inserted in dielectric materials commonly used in AN connectors. The creepage distance, or rather the voltage breakdown (arc over or corona) values were measured as a function of pressure, temperature and humidity. Five different dielectrics were tested and found to possess no measurable differences in surface flashover characteristics. This investigation indicates that breakdown in air at reduced pressure is the limiting factor in selecting creepage distances. It is also indicated that arc resistance (resistance of surface to carbornizing under an electric arc) should carry more weight than dielectric strength in the selection of connector insert materials. NRL E-2792.

Dielectric heating. U. S. Office of Technical Services. Jun 1953. 13p Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Mimeo: $.25. PB 111177

1. Heating, Dielectric 2. Heating, Dielectric - Bibliography 3. TAS 103.

Fine powder permanent magnets. First annual report under Contract no. Nonr 610 (01) covering period to Jan 15, 1953, by N. L. Ananthanarayanan. Lehigh University. Institute of Research, Bethlehem, Pa. Jan 1953. 54p photos, drawing, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 109910

1. Magnets, Permanent - Materials 2. Iron powders - Magnetic properties 3. Iron powder compacts - Magnetic properties.

Fresnel zone plate antenna, by I. Maddaus, Jr. U. S. Naval Research Laboratory. Jun 1948. 22p photo, diagr, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 109746

The Fresnel zone plate antenna utilizes as a focusing objective a plate which discards the radiation from alternate Fresnel zones or reverses its phase. Use for focusing microwave radiations is discussed. NRL R-3293.

Investigation of the plate materials of the lead acid cell. First report: Compound formation between lead monoxide and lead sulfate, by J. J. Lander. U. S. Naval Research Laboratory. Mar 1948. 23p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 109747

Investigation of compounds, and their formulas formed between PbO and $PbSO_4$. Phase diagram for melts of these substances showed formation of compounds: $PbSO_4.4PbO$, $PbSO_4.2PbO$, and $PbSO_4.PbO$. Wet method of preparation leads to formation of compounts: $PbSO_4.4PbO$, $PbSO_4.PbO$, and a hydrous compound tentatively assigned the formulas: $PbSO_4.3PbO.H_2O$. X-ray methods of analysis support these formulas. NRL C-3262.

Micro-radiography manual, by E. I. Salkovitz. U. S. Naval Research Laboratory. Apr 1946. 30p photos, fold graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109531

Simple micro-radiographic techniques can be applied to thin samples of materials for the detection and study of micro-discontinuities, such as microshrinkage, segregation and inclusions. Good results can be obtained on copper base alloys using an industrial type tungsten target X-ray tube. Even better results are obtained if a copper filter is employed. However, for the study of certain other alloy systems, it is generally necessary to use the characteristic radiation of X-ray diffraction tubes. NRL M-2810.

Noise theory for the magnetron. II: Steady state symmetrical space charge distribution in a magnetron, by R. Q. Twiss. Massachusetts Institute of Technology. Research Laboratory of Electronics. Nov 1949. 64p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 109630

A theory which takes into account the Maxwellian velocity distribution of the cathode injection current is given for the steady state distribution in a magnetron. It is found that the indeterminacy, which characterized earlier solutions of this problem, disappears as soon as the assumption of zero initial velocity is abandoned, and that the electron flow is essentially a double stream one, no matter what the ratio of anode to cathode radius. An exact solution is obtained for the linear magnetron when the initial tangential velocity distribution is ignored. Expressions are given from which it is possible to calculate such features of the steady state as the circulating current, average transit time width of space charge cloud etc., in terms of the parameters of the tube and of the external fields. Part I is Technical report no. 116; part III is Technical report no. 118. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102 B-O. MIT RLE TR117.

On the variation of conductivity within sealed rooms, by L. G. Smith and G. F. Schilling. California. University. Institute of Geophysics. Apr 1953. 19p graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109622

Experiments are described in which the electrical conductivity of air was measured inside sealed rooms. It was found that the conductivity increased regularly, with some fluctuations superimposed, towards a certain limiting value which was about the same in each of the rooms. The interpretation of this variation is examined on the basis of ion-equilibrium. Contract no. AF 19(122)-254. Scientific report no. 7.

Parallel operation of magnetrons, by Winston Bostick, Edgar Everhart, Melvin Labitt. Massachusetts Institute of Technology. Research Laboratory of Electronics. Sep 1946. 8p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109955

As many as three magnetrons have thus far been successfully operated together with coherence in phase and equality of frequency in a repetitive system which promises to permit the operation of n magnetrons into n+1 loads, each of impedance Z_0, the characteristic impedance of the line. Contract W36-039-sc-32037. MIT RLE TR14.

Procedure for conducting contact resistance (millivolt drop) tests on AN connectors, by J. Clay Staples and Lloyd J. Money. U. S. Naval Research Laboratory. Apr 1946. 24p drawings, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109530

1. Connectors, Electric - Tests 2. NRL E-2816.

Quarterly progress report, 1 Jan 1953-31 Mar 1953, under Contract nos. W33(038)ac-16649 and W19(122) ac-38, by D. H. Goodman. California. University. Div. of Electrical Engineering. Electronics Research Laboratory, Microwave Tube Group, Berkeley, Calif. Apr 1953. 22p drawing, diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109669

Final report.
1. Tubes, Electron - Research 2. Vacuum tubes, Cathode ray 3. Resnatron 4. Oscillators, Electron tube 5. UC IER ML TR 66.

Searchlight technique for exploring the atmosphere. Final report, period Nov 1, 1951 to Oct 31, 1952, under Contract no. AF19(604)-108, by P. C. Bettler. Alaska. University. Geophysical Institute. Oct 1952. 14p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109667

The measurement of the density of the atmosphere by the searchlight technique has been investigated. With the present apparatus, useful measurements are limited to approximately 45 km, due to the noise introduced by the background light from the night sky. It is shown that a significant improvement in the results can be made only by increasing the intensity of the searchlight beams. A method for decreasing the effect of the background noise is discussed.

Solid supersonic delay line. Andersen Laboratories, Inc., West Hartford, Conn. Under Contract no. AF19(122)-310. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

Interim engineering report, Sep 20, 1950 to Dec 20, 1950. Jan 1951. 38p photos, diagrs, tables Microfilm $2.25, Photostat $5.00. PB 109943

1. Lines, Delay - Materials 2. Nickel - Magnetic properties 3. Crystals, Quartz - Magnetic properties 4. Waves, Supersonic - Propagation.

Interim engineering report no. 4, Oct 1, 1951 to Dec 30, 1951. Feb 1952. 12p photos Microfilm $1.75, Photostat $2.50. PB 109944

1. Lines, Delay - Materials 2. Waves, Supersonic - Propagation 3. Crystals, Quartz - Magnetic properties.

Final engineering report, no. 5, Dec 30, 1951 to Feb 29, 1952. Feb 1952. 26p photos, diagrs, table Microfilm $2.00, Photostat $3.75. PB 109945

This final period and summary report includes a section devoted to a procedure for measuring the attenuation and bandwidth characteristics of a delay line, and portions devoted to the nickel studies, the newly designed fused quartz lines, as well as the other minor phases of the study program. A final section summarizes the work done during the period of the contract.

Study on carrier frequency coaxial cables and connectors. Final report Jun 10, 1951 to Mar 1953, under Contract no. DA36-039-sc-5496, by F. Gooding and H. Slade. Okonite Co., Passaic, N. J. Mar 1953. 40p photos, fold drawing, fold graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109851

This report describes the fabrication on a production scale of 25 miles of the coaxial cable, and attaching a connector to each end. The application of the connector to the cable is described in detail, including technique of assembly and filling with sealing compound.

FOOD AND KINDRED PRODUCTS

Grain structure and grain storage, by M. M. MacMasters. U. S. Bureau of Agricultural and Industrial Chemistry. Northern Regional Research Laboratory, Peoria, Ill. Feb 1953. 12p Available from U. S. Dept. of Agriculture, Bureau of Agricultural and Industrial Chemistry, Northern Regional Research Laboratory, Peoria, Ill. PB 109742

1. Grain storage 2. Grain structure - Theory 3. AIC 348.

Nut shells and fruit pits, their composition, availability, agricultural and industrial uses, by T. F. Clark and E. C. Lathrop. U. S. Bureau of Agricultural and Industrial Chemistry. Northern Regional Research Laboratory, Peoria, Ill. Feb 1953. 43p tables Available from U. S. Dept. of Agricultural, Bureau of Agricultural and Industrial Chemistry, Northern Regional Research Laboratory, Peoria, Ill. PB 109744

1. Seeds, Fruit - Uses 2. Shells (Nut) - Uses 3. Agricultural residues - Uses 4. AIC 352.

Refrigerated gas-storage of Gros Michel bananas: Pilot plant experiments, by R. Gane, C. R. Furlong, J. E. Robinson and H. J. Shepherd. Gt. Brit. Dept. of Scientific and Industrial Research. Food Investigation Board. 1953. 54p photo, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.50. PB 109799

S. O. code no. 47-155-3.
1. Bananas - Refrigeration - Gt. Brit. 2. Refrigeration, Marine - Carbon dioxide gas - Gt. Brit. 3. Carbon dioxide - Use in refrigeration - Gt. Brit. 4. Gros Michel (Bananas) 5. DSIR FI TP 3.

Soybeans: Selected list of references, compiled by Nellie G. Larson and John C. Cowan. U. S. Bureau of Agricultural and Industrial Chemistry. Northern Regional Research Laboratory, Peoria, Ill. May 1953. 11p Available from U. S. Dept. of

Agriculture, Bureau of Agricultural and Industrial Chemistry, Northern Regional Research Laboratory, Peoria, Ill. PB 109745

1. Soybeans - Bibliography 2. AIC 355.

Whalemeat: Production and preservation, by J. G. Sharp and B. B. Marsh. Gt. Brit. Dept. of Scientific and Industrial Research. Food Investigation Board. 1953. 60p photos, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 109798

S. O. code no. 47-8-58.
1. Whale meat - Production - Gt. Brit. 2. Whale meat - Preservation - Gt. Brit. 3. DSIR FI SR 58.

FUELS AND LUBRICANTS

Alcohol-water injection for farm tractors, by John D. Hummell and Richard Wiebe. U. S. Bureau of Agricultural and Industrial Chemistry. Northern Regional Research Laboratory, Peoria, Ill. Feb 1953. 13p photo, drawing, graphs Available from U. S. Dept. of Agriculture, Bureau of Agricultural and Industrial Chemistry, Northern Regional Research Laboratory, Peoria, Ill. PB 109743

1. Engines, Spark-ignition - Fuels 2. Gasoline - Octane number 3. Gasoline - Additivies 4. AIC 349.

Continuous fuel sprays, by R. A. Dodge, W. W. Hagerty, J. W. Luecht, and J. L. York of the Faculty of the College of Engineering and D. R. Glass, H. E. Stubbs, and R. A. Yagle, Research Associates, Engineering Research Institute. Michigan. University, Ann Arbor, Mich. Nov 1950. 61p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 109635

The subject is approached in three ways: a photographic technique which does not require a captured sample was developed to measure the size and velocity distribution of the drops in any spray; a rapid spray analyzer was developed which provides information to evaluate nozzle performance and to match sets of nozzles, and can serve as a production control device; and a combustion program was established to determine the degree of correlation between the spray characteristics of a nozzle and combustion performance. Each part of this research is described in a separate section. Descriptions of the apparatus are given, theories or reasons for using certain methods are outlined, and actual test data are presented and analyzed. Contract no. W-33-038-ac-21230. AAF TR 6067, part 2.

Development of qualification test methods for gear lubricants, by H. Ruwe Barton. Armour Research Foundation, Chicago, Ill. Under Contract no. DA-11-022-ORD-905. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

Progress report no. 4. Nov 1952. 7p Microfilm $1.25, Photostat $1.25. PB 109777

1. Gears - Lubrication 2. Lubricants - Testing equipment 3. ARF Proj L 030-9, Report no. 4.

Progress report no. 5. Dec 1952. 5p table Microfilm $1.25, Photostat $1.25. PB 109778

1. Gears - Lubrication 2. Lubricants - Testing equipment 3. ARF Proj L 030-9, Report no. 5.

Progress report no. 6. Jan 1953. 8p Microfilm $1.25, Photostat $1.25. PB 109784

1. Gears - Lubrication 2. Lubricants - Testing equipment 3. ARF Proj L 030-9, Report no. 6.

Progress report no. 7. Feb 1953. 7p Microfilm $1.25, Photostat $1.25. PB 109785

1. Project no. TB5-3010.
1. Gears - Lubrication 2. Lubricants - Testing equipment 3. ARF Proj L 030-9, Report no. 7.

Progress report no. 8. Mar 1953. 9p Microfilm $1.25, Photostat $1.25. PB 109924

Project no. TB5-3010.
1. Gears - Lubrication 2. Lubricants - Testing equipment 3. ARF Proj L 030-9, Report no. 8.

Gas. Report of a productivity team representing the British gas industry, which visited the United States of America in 1952. Anglo-American Council on Productivity. May 1953. 246p photos, drawings, diagrs (1 fold) graphs, map, tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.90. PB 106477

1. Gas industry 2. Gas, Natural 3. Gas, Natural - Pipe lines 4. Gas - Manufacture.

Physical properties of concentrated nitric acid, by W. L. Sibbitt, C. R. St. Clair, T. R. Bump, P. F. Pagerey, J. P. Kern and D. W. Fyfe. U. S. National Advisory Committee for Aeronautics. Jun 1953. 19p graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109790

1. Nitric acid - Properties 2. Nitric acid, White fuming - Thermal properties 3. Purdue University, Lafayette, Ind. 4. NACA TN 2970.

Reaction processes leading to spontaneous ignition of hydrocarbons, by Charles E. Frank and Angus U. Blackham. U. S. National Advisory Committee for Aeronautics. Jun 1953. 27p diagr, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109709

1. Combustion, Spontaneous 2. Hydrocarbons - Ignition 3. Propane, 2-Methyl - Reactions 4. Hexane, 2,2,5-Trimethyl - Reactions 5. Cincinnati. University, Cincinnati, O. 6. NACA TN 2958.

Removal of vanadium from crude oil by ion exchange, by Thomas L. McClintock. Jan 1950. 70p diagr, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 109769

Experiments were performed in two phases to determine the feasibility of removing naturally occurring vanadium from Languinalas (Venezuelan) crude oil by the process of ion exchange. The subject crude oil was contacted with samples of each of the major types of ion exchange resins and inorganic zeolite type exchangers under a wide variety of operating conditions.

HIGHWAYS AND BRIDGES

Some economic effects of highway improvement, presented at the 32d annual meeting, Jan 13-16, 1953. Highway Research Board. 1953. 27p diagrs, graphs, maps, tables Available from Highway Research Board, 2101 Constitution Ave., N. W., Washington 25, D. C. $.45. PB 109651

Contents: Economic evaluation of two Indiana bypasses, by A. K. Branham, A. D. May, Jr., and H. L. Michael. - Socio-economic relationships of highway travel of residents of a rural area, by Lorin A. Thompson and Carl H. Madden.
1. Traffic - Research 2. Traffic - Research 3. Bypasses - Economic effects 4. Travel - Economic effect 5. NRC 256 6. HRB Bul 67.

INSTRUMENTS

Air ionization gauge (dual ionization gauge). Final research report, Oct 1, 1952 to Nov 30, 1952, by Floyd R. Banks, Jr. Vacuum-Electronic Engineering Co., New Hyde Park, N. Y. Feb 1953. 27p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109854

This is a summary review of the research which has been conducted on the dual or differential ionization gauge. The principles of operation of the dual gauge are reviewed; the apparatus used during most of the measurements is described, and the procedures followed, are presented; and the data which have been obtained are analyzed and discussed. The design features and method of operation of a single stage differential ionization gauge are reviewed, and some particular areas of usefulness of a gauge of this type are indicated. Report no. 390-8. Contract no. AF19(122)-390.

Calibration of a continuously recording air-conductivity apparatus of the Gerdien type, by L. G. Smith. California. University. Institute of Geophysics. Feb 1953. 8p diagr Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109589

A procedure is described for the absolute calibration of a continuously recording air-conductivity meter of the type originated by Gerdien. A novel experimental method has been evolved to find the value of the capacity between those parts of the electrode system which are effective in the collection of ions. Contract no. AF19(122)-254. Scientific report no. 6.

Cathode-ray tube counter. Quarterly progress report no. 1, Jan 1 to Mar 31, 1950, under Contract no. AF19(122)-170, item 2, by H. P. Stabler. Williams College, Williamstown, Mass. Mar 1950. 12p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109914

This preliminary report describes a cathode-ray tube counter and the initial experimental work that has been undertaken to investigate its possibilities. A DuMont Type 208B oscillograph with a 5LP5 cathode-ray tube, a twenty step grid mask, and a 931A photomultiplier have been utilized. While the counting rate of the initial model is limited to about 1000 counts per second, higher speeds and closer resolution should be possible in a later model. A reversible type of counter grid mask is also described, and a few possibilities of similar line type patterns are pointed out.

Coding of problems for the Ordvac, by Viola Woodward. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Dec 1952. 69p diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 109847

This report covers all phases of coding problems for the Ordvac. Since the machine operates in the binary number system, a section is included on binary arithmetic. The physical characteristics of the Ordvac, its setup and the operation of its components are all discussed. A detailed list of orders is included, and standard programming and current operating procedures are discussed in detail. APG BRL M634.

Comparison of colorimetric methods; determination of color characteristics of some Corning filters and fluorescent cloths, by L. R. Furlong. U. S. Naval Research Laboratory. Mar 1948. 21p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 109735

Investigation of Gaertner monochromator, General Electric recording spectrophotometer, Donaldson

trichromatic colorimeter and Nutting monochromatic colorimeter indicated that nonvisual spectrophotometric methods of color measurement is most desirable because subjective error is reduced. NRL N-3256.

Computer components fellowship no. 347. Mellon Institute of Industrial Research, Pittsburgh, Pa. Under Contract no. CLN AF 19/122/-376, by J. R. Bowman, F. A. Schwertz, A. Milch, B. Moffat, R. T. Steinback, Leo Nickel, B. O. Marshall, Jr. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

Quarterly report no. 1, Oct 11, 1950 to Jan 11, 1951. Jan 1951. 47p photos, diagr, graphs, tables Microfilm $2.50, Photostat $6.25. PB 109935

Quarterly report no. 2, Jan 11, 1951 to Apr 11, 1951. Apr 1951. 52p photos, diagrs, graphs, tables Microfilm $2.75, Photostat $7.50. PB 109936

Quarterly report no. 4, Jul 10, 1951 to Oct 10, 1951. Oct 1951. 83p photos, diagrs, graphs, tables Microfilm $3.75, Photostat $11.25. PB 109937

Quarterly report no. 5, Oct 11, 1951 to Jan 10, 1952. Jan 1952. 85p photos, diagrs, graphs, tables Microfilm $3.75, Photostat $11.25. PB 109938

Quarterly report no. 6, Jan 11, 1952 to Apr 10, 1952. Apr 1952. 92p photos, drawings, diagrs, graphs, tables Microfilm $4.25, Photostat $1.250. PB 109939

Quarterly report no. 7, Apr 11, 1952 to Jul 10, 1952. Jul 1952. 95p photos, diagrs, graphs, tables Microfilm $4.25, Photostat $12.50. PB 109940

Continuous recording point gauge for the measurement of surface waves, by W. D. Baines and I. D. Smith. National Research Council of Canada. Division of Mechanical Engineering. Mar 1953. 21p photo, drawing, diagr, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Available for exchange from Div. of Mechanical Engineering, National Research Council of Canada, Montreal Road, Ottawa, Canada. PB 109727

The Fraser River Model staff of the National Research Council have developed an instrument which will measure water surface elevations to within 0.001 foot and respond to water level changes of 0.15 foot in 1/10 second. It consists of a weighted probe, which, when it touches the water, energizes a solenoid in such a way as to withdraw the probe from the water. The theoretical solution of the probe motion has been worked out and checked with the characteristics of the completed instrument. The instrument is simple, rugged, and will function in any semi-conducting fluid. NRCC MH-38.

Design of fire control optics, vol. 1: Application of fundamental laws of geometrical optics to individual optical components. U. S. Ordnance Corps. Aug 1952. 323p diagrs, tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Mimeo: $3.00. PB 111152

Ordnance Corps manual ORD M2-1.
1. Optics, Geometrical 2. Instruments, Fire control.

Exposure meters for X-ray and gamma ray radiography, by Herbert Friedman and A. L. Christenson. U. S. Naval Research Laboratory. Dec 1941. 23p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109852

Exposure meters for x-ray and gamma radiography are described which utilize Geiger-Muller counters as the sensitive elements. Suitable counter designs and an electrical intensity meter circuit are given. All the variables that introduce so much uncertainty into the use of technique charts are automatically accounted for by the exposure meters. The meters are easy to use and their employment will improve radiographic practice. NRL M-1801.

High frequency crystal-controlled oscillator circuits, by William A. Edson. Georgia Institute of Technology. State Engineering Experiment Station, Atlanta, Ga. Under Contract no. W36-039-sc-36841. Project no. 131-45. Dept. of the Army project: 3-99-11-022. Signal Corps project: 142B. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Progress report no. 1. Aug 1948. 9p Microfilm $1.25, Photostat $1.25. PB 109752

1. Oscillators, Crystal controlled 2. Meters, Frequency - Crystal.

Progress report no. 2. Nov 1948. 13p diagrs Microfilm $2.25, Photostat $5.00. PB 109753

1. Oscillators, Crystal controlled 2. Meters, Frequency - Crystal.

Progress report no. 3. Feb 1949. 72p diagrs, graphs, table Microfilm $3.50, Photostat $10.00. PB 109754

1. Oscillators, Crystal controlled 2. Oscillators, Grounded grid 3. Meters, Frequency - Crystal.

Progress report no. 4. May 1949. 92p diagrs, graphs, tables Microfilm $4.25, Photostat $12.50. PB 109755

1. Oscillators, Crystal controlled 2. Oscillators, Grounded grid 3. Oscillators - Frequency stabilization 4. Transmission lines - Impedance - Mathematical analysis 5. Transformers - Design 6. Crystals, Quartz - Resistance - Measurement 7. Networks, Electrical - Transfer characteristics.

Progress report no. 5. Aug 1949. 66p diagrs, graphs, tables Microfilm $3.00, Photostat $8.75. PB 109756

1. Oscillators, Crystal controlled 2. Oscillators, Grounded grid 3. Oscillators - Frequency stabilization 4. Transformers - Design 5. Transmission lines - Impedance - Mathematical analysis.

Progress report no. 6. Nov 1949. 54p diagrs, graphs, tables Microfilm $2.75, Photostat $7.50. PB 109757

1. Oscillators, Crystal controlled 2. Oscillators, Grounded grid 3. Oscillators - Frequency stabilization 4. Phase meters 5. Crystals - Electrical properties - Measurement.

Progress report no. 7. Feb 1950. 47p diagrs, graphs, table Microfilm $2.50, Photostat $6.25. PB 109758

1. Oscillators, Crystal controlled 2. Networks - Filters - Theory 3. Networks, Electrical - Design 4. Crystals - Electrical properties - Measurement 5. Oscillators, Grounded grid.

Progress report no. 8. May 1950. 63p diagrs, graph, tables Microfilm $3.00, Photostat $8.75. PB 109759

1. Oscillators, Crystal controlled 2. Oscillators, Grounded grid 3. Oscillators, Cathode doupled 4. Oscillators, Impedance inverting 5. Oscillators, Transformer coupled 6. Oscillators - Frequency stabilization 7. Transformers - Design.

Inexpensive recording differential manometer suitable for reaction kinetics measurements, by George R. Thomas and Norman N. Lichtin. Boston University. Chemistry Dept., Boston, Mass. n.d. 19p photo, drawings Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109904

Scientific report no. 2 under Contract no. AF19 (122)-405.
1. Manometers - Design 2. Kinetic reactions - Measurement.

Investigations for design of digital calculating machinery. Progress report no. 7 covering period Nov 10, 1949-Feb 10, 1950, under Contract W19-122-ac-24, by Richard Hofheimer and Jean Crawford. Harvard University. Computation Laboratory. Feb 1950. 139p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $5.50, Photostat $17.50. PB 109947

Contains Computation of Mathieu functions, by Theodore Singer.
1. Computers, Digital - Design 2. Computers, Digital - Circuits 3. Computers, Digital - Components 4. Lines, Delay - Design 5. Mathieu functions (Aeronautics) 6. Facsimile equipment, Ultra high speed 7. Multipliers, Cathode ray.

Kinetics of the reactions of NO and O_2 with derivatives of hexaphenylethane in inert media. Final report under Contract no. AF19 (122)-405, by Norman N. Lichtin. Boston University. Dept. of Chemistry, Boston, Mass. n.d. 11p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109894

1. Atmosphere - Research - Apparatus 2. Manometers - Design 3. Ethane, Hexaphenyl - Derivatives - Reactions 4. Nitrogen oxides - Determination 5. Oxygen - Reaction.

Machine solution of problems for the Office of Air Research, by Holly Wilkins and Robert Burns. Harvard University. Computation Laboratory. Under Contract AF33(038)-9461. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Progress report no. 11 covering period 1 Jun 1950-1 Sep 1950. Sep 1950. 147p tables Microfilm $5.75, Photostat $18.75. PB 109636

Contents: Problem report no. 19. Mach numbers, free air temperatures and true air speeds for subsonic flight, by Warren L. Semon. - Problem report no. 20. Matrix elements computed in connection with the calculation of internal conversion coefficients for the K-shell, by John A. Harr and Peter F. Strong.
1. Mark I (Calculator) 2. Mach number - Tables 3. Atmosphere - Temperature - Tables 4. Air speed - Tables 5. Matrices - Tables.

Progress report no. 12 covering period 1 Sep 1950-15 Oct 1950. Sep 1950. 290p tables Microfilm $9.00, Photostat $36.25. PB 109780

Contents: Problem report no. 16. Flow patterns with a free stream Mach number close to one, by Peter F. Strong. - Problem report no. 21. Waveguide wavelength to free space wavelength and frequency conversion tables for service and RMA standard rectangular waveguides, by Warren Semon.
1. Computers, Digital 2. Mark I (Calculator) 3. Tables, Mathematical 4. Mach number - Effect 5. Flow - Tables 6. Wavelengths - Tables.

Progress report no. 14 covering period 15 Oct 1950-1 Dec 1950. Dec 1950. 71p tables Microfilm $3.50, Photostat $10.00. PB 109948

Contains Solution of thermal boundary layer equations (AF problem 45) by J. Orten Gadd, Jr.
1. Computers, Digital 2. Mark I (Computer) 3. Boundary layer - Theory 4. Tables, Mathematical

Modern instruments for atmospheric-electric measurements, part I, by G. F. Schilling, L. G. Smith, S. Ruttenberg, R. Dickinson. California. University. Institute of Geophysics. Feb 1953. 28p photos, diagrs, graphs Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Mimeo: $.75. PB 111168

Scientific report no. 5 under Contract no. AF 19-(122)-254.

1. Atmosphere - Electricity - Measuring equipment
2. Electrometers - Design.

Multi-range electronic apparatus for measuring and recording phosphorescent decay, by W. S. Plymale, Jr. U. S. Naval Research Laboratory. Mar 1948. 16p photos, diagrs (1 fold),graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.50.
PB 109574

The measurement of the decay time and photographic recording of curves showing decay periods of phosphors from 2 x 10^{-4} second to several hours is made with the apparatus described. Multi-range time scales, low brightness sensitivity, and the convenience of recording transients are features of the apparatus. NRL N-3264.

Multitube differential pressure manometer for measuring the average flow of fluids in closed ducts, by George B. Clark. Illinois. Engineering Experiment Station, Urbana, Ill. Mar 1953. 30p diagrs, graphs, tables Available from University of Illinois. Engineering Experiment Station, Urbana, Ill. $.30.
PB 109650

University of Illinois Bulletin, vol. 50, no. 51, Mar 1953.
1. Flow, Fluid - Measurements 2. Manometers, Pressure - Multitube 3. Ducts, Closed - Flow - Measurements 4. Mines - Ventilation 5. Pitot tubes - Pressure measurements 6. ILU EES B 410.

Portable precision frequency meter. Part III: Simplified direct-reading meter, by G. K. Jensen and J. E. McGeogh. U. S. Naval Research Laboratory. Mar 1953. 24p photos, diagrs, table Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75.
PB 111182

A modification of the originally proposed frequency meter, which contained three major components consisting of internal frequency generator, mixer, and comparison circuits, provides significant improvements in two of the three components. In the internal frequency generator the major charge is to provide a 10:1 frequency range on each of four bands which now cover a total range of 100 kc to 1000 Mc, and to provide additional decade frequency selector controls which enable frequency adjustment in very small steps, each of crystal accuracy, to approach continuous tuning. Direct decade frequency reading from the front panel without the frequency equation and elimination of the necessity for an accurately read difference frequency have been achieved by the above changes. For Part I see PB 99586. NRL R4111.

Services and materials in connection with the adaptation of upper air vehicles for upper air experiments. Final report Mar 21, 1950-Apr 15, 1953, under Contract AF 19 (122)-215, by Austin S. Hogan. Wentworth Institute, Boston, Mass. Apr 1953. 188p photos, drawings (part fold) Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $6.75, Photostat $23.75.
PB 109779

1. Atmosphere, Upper - Research 2. Instruments, Meteorological - Design 3. Sky - Brightness - Measurement 4. Amplifiers, Low frequency - Design 5. Cameras, Recording 6. Rockets, Upper air - Equipment 7. Balloons, Meteorological - Transmitters 8. Missiles, High altitude 9. Doors, Ejection - Design 10. Aerobee (Rocket) 11. V-2 (Rocket) 12. "Moby Dick" project.

Services, facilities and materials required for research and development of accurate fixed non-wire-wound resistors. Third and fourth quarterly progress report, 1 Dec 1950 to 1 Jul 1951, under Contract DA36-039-sc-50, by J. W. Jira and H. Braschwitz. Continental Carbon, Inc., Cleveland, Ohio. Jul 1951. 45p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25.
PB 109637

Dept. of the Army project no. 3-26-00-600. Signal Corps project no. 32-2006-31.
1. Resistors, Non-wire-wound.

Signal Corps electronic computer research and development. Quarterly progress report no. 13, period 4 Jan 1953 to 3 Apr 1953, under Contract no. DA36-039-sc-14, by Simon E. Gluck and W. W. Wachter. Pennsylvania. University. Moore School of Electrical Engineering. Apr 1953. 29p diagrs, table Available from Library of Congress, Publication Board, Washington 25, D. C. Microfilm $2.00, Photostat $3.75.
PB 109634

This report includes a description of the preliminary design of the MSAC power distribution system, console layout and interconnections, and some work on the power control system. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 18-102B. Appendix is General requirements for MSAC one megacycle and eight megacycle radio frequency generators. Jan 1953.

Small Pirani gage for measurements of nonsteady low pressures, by M. John Pilny. U. S. National Advisory Committee for Aeronautics. Jun 1953. 37p photos, diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C.
PB 109642

1. Gages, Pirani 2. Pressure, Low - Measurement 3. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 4. NACA TN 2946.

Some electronic analog computer techniques, by Edward J. Robb and Howard L. Heydt. Connecticut. Engineering Experiment Station, Storrs, Conn. 18p diagrs Available from University of

Connecticut, Engineering Experiment Station, Storrs, Conn. PB 109840

Bulletin no. 9, Jan 1953.
1. Computers, Electronic - Operation 2. Computers, Digital - Operation 3. CEES B 9.

Storage and switching. Quarterly progress report no. 1 under Contract no. AF19(122)-170, item 1, period Jan 1 to Mar 31, 1950, by A. G. Emslie. Williams College, Williamstown, Mass. Apr 1950. 13p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109930

A brief discussion is given of the generation and transmission of information and of the interaction of data and control channels. The difference between single and multiple information channels is considered and numerical examples of channel capacity are given for photographic and radar reception. Analog storage, of both the intensity and deflection types, is dealt with in terms of the number of space dimensions occupied by the stored information. Digital storage is also discussed with reference to the dimensional and continuity requirements of the storage medium. Some estimates of the properties of various million-digit storage systems are given, including recording speeds, selection times and physical size. The systems are classified into aperiodic mechanically-operated devices, high-speed periodic devices, and devices with stationary storage elements. The problem of obtaining rapid selection together with reasonable physical size is briefly discussed.

Studies on heat transfer in laminar free convection with the Zehnder-Mach interferometer, by E.R.G. Eckert and E. E. Soehngen, edited by H. J. Keating. U. S. Air Materiel Command. Engineering Division. Power Plant Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Dec 1948. 26p photos, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109760

Heat transfer in thermal free convection of air was investigated with the aid of Zehnder-Mach interferometer on bodies with different shapes such as vertical plates; horizontal cylinders with circular and square cross-sections; arrangements of two and three horizontal cylinders; and an air-space enclosed between two horizontal concentric cylinders. All forms had in common that the convection flow set-up was two-dimensional. Free convection heat transfer has immediate application-possibilities for modern aircraft power plants for cooling and insulating problems connected with the handling of jet-engine fuels and rocket propellants. In the course of the studies, it was found that valuable information can be gained, by the interferometer method used, on turbulence. Data on thermal convection are useful also in understanding radial flow phenomena, which are caused by centrifugal forces in turbo-compressors and turbines. AAF TR 5747.

Reciprocity calibration of primary vibration standards, by Sanford P. Thompson. U. S. Naval Research Laboratory. Aug 1948. 12p photos, diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $2.50. PB 109571

The reciprocity method for the absolute calibration of vibration transducers is reviewed, and the design and calibration of a set of primary standard transducers are described. Resulting calibrations are shown to be accurate up to at least 700 cycles per second. NRL F-3337.

Test of six wire wound fixed resistors submitted by Hardwick, Hindle, Inc., prepared by Harold A. Brinkman. U. S. Naval Research Laboratory. Jul 1942. 12p photos, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109514

1. Resistors, Fixed - Tests 2. Resistors, Wire wound - Tests 3. Hardwick, Hindle, Inc., Newark, N. J. 4. NAVSHIPS Prob M3-36 5. NRL R-1913.

Test of 3 and 5 kilovolt voltmeter multiplier resistors submitted by International Resistance Co., prepared by Harold A. Brinkman. U. S. Naval Research Laboratory. Jul 1942. 12p photo, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109565

1. Resistors, Wire-wound - Tests 2. International Resistance Co., Philadelphia, Pa. 3. NAVSHIPS Prob M3-31 4. NRL R-1885.

Thermistor thermometry in investigational work, by George W. Mather and Allan Hemingway. U. S. Air Force. Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska. Mar 1953. 12p photos, diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109603

Contract no. 18(600)-413.
1. Resistors, Non-linear 2. Electrothermometry 3. Minnesota. University. School of Veterinary Medicine 4, AAF AAL Proj. 22-1301-0002.

Three-level capillary viscometer for the study of anomalous flow in sealed systems, by John G. Honig and C. R. Singleterry. U. S. Naval Research Laboratory. Apr 1953. 13p drawing, graphs, table Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.50. PB 111181

The instrument is simple in design and operation, and permits repeated and reproducible measurements. The absolute dimensions of the instrument may be determined from X-ray photographs and direct measurements. The viscometer was designed to permit measurements in a sealed instrument on a system whose viscosity may vary over a hundredfold range. NRL R4133.

MACHINERY

Application of a three-phase motor to servomechanisms, by John E. Hart. U. S. Naval Research Laboratory. May 1953. 34p diagrs, graphs Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.00. PB 111184

A three-phase servomechanism employing magnetic voltage and power amplifiers was designed and constructed. The operating data for this system are utilized in the presentation of a quantitative comparison to servomechanisms employing other types of servo motors. NRL R4168.

Investigation as to methods of mounting of large unbalanced structures rotating about the vertical axis. Final report under Watson Laboratory Contract no. W19-122-ac-8, by Ernest E. Leavitt. Tufts College. Mechanical Engineering Dept., Medford, Mass. May 1949. 50p drawings, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109941

Exhibit D is list of patents granted, 1925-1949, p. 15-43.
1. Machines, Rotating - Mounts 2. Machines, Rotating - Mounts - Patents 3. Mountings - Design.

Metal cutting and tool temperatures, by Charles P. Carman. Sep 1948. 90p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 109828

Available information on the subjects of metal cutting and tool life investigations was reviewed and correlated. A testing apparatus and method for reading cutting temperatures, which occur at the tool-work interface during the metal cutting operation on an engine lathe, were developed. The apparatus and method were tested under varying conditions of surface speed, tool shape, and depth of cut, and the resultant data compared with that of other investigations. Thesis-Rensselaer Polytechnic Institute.

MEDICAL RESEARCH AND PRACTICE

Biochemistry of tissue trauma. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. AAF SAM Proj 21-1601-0017. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

II: Effects of heparin on the hyperlipoproteinemia of local cold injury, by Robert F. Redmond, Lawrence J. Milch, and William W. Calhoun and Cardiovascular Research Group. Mar 1953. 5p tables Microfilm $1.25, Photostat $1.25. PB 109678

1. Tissue - Effects of cold 2. Trauma - Physiological effects 3. Heparin - Physiological effects 4. Cold - Physiological effects 5. Lipoproteins - Biochemistry 6. Lipoproteins - Effects of cold 7. Rabbits - Cold - Exposure - Effects on cardiovascular system.

III: Plasma lipoprotein changes induced by mild local cold injury, by Robert F. Redmond, Lawrence J. Milch, and William W. Calhoun. May 1953. 5p tables Microfilm $1.25, Photostat $1.25. PB 109679

1. Lipoproteins - Biochemistry 2. Lipoproteins - Effects of cold 3. Tissue - Effects of cold 4. Rabbits - Cold - Exposure - Effects on cardiovascular system 5. Cold - Physiological effects 6. Blood plasma - Effects of cold.

Dual retinoscope for instructional purposes, by Mathew R. Wilson and Horst G. Fleck. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1953. 5p photos Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109681

By means of the dual retinoscope the instructor retinoscopist can demonstrate the various reflex movements which are seen in cases of simple hyperopia, simple myopia, simple astigmatism, compound hyperopic astigmatism, compound myopic astigmatism, and mixed astigmatism. The neutralization of these errors in refraction can also be demonstrated as instructor and student observe identical choroidal reflexes simultaneously. AAF SAM Proj Special report.

Effective tracheal and intrathoracic pressures obtained with the D-1 pressure-demand regulator, by Richard W. Bancroft and Ulrich C. Luft. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Apr 1953. 11p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109672

1. Respirators, Oxygen generating - Design 2. D-1 (Pressure-demand regulators) 3. Pressure regulators, Oxygen 4. Altitude, High - Physiological effects 5. AAF SAM Proj. 21-1201-0008, Report no. 1.

Evaluation of the Grether-self-administering color vision, by Ingeberg Schmidt. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Mar 1953. 11p drawings, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109680

The Self-Administering Color Vision Test, makes possible the testing of color vision and registration of the score without the help of an examiner. The apparatus was evaluated by comparing it with three

other color vision tests now in use. Experiments were carried out with respect to problems of administration. Suggestions are made for improvement of the test. The apparatus could effectively be used in a classroom to demonstrate the performance of color defectives in matching colors. AAF SAM Proj Special report.

Rapid decompression with pressure-demand oxygen equipment, by Ulrich C. Luft, Richard W. Bancroft, and Earl T. Carter. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Apr 1953. 7p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109673

Pressure-demand oxygen equipment was used in 35 rapid decompressions from a simulated cabin altitude of 20,000 to 25,000 feet to a simulated flight altitude of 47,000 to 50,000 feet in 0.3 to 0.5 seconds during normal respiratory activity. During decompression, mask pressures reached an average peak of 61 mm. Hg (range, 38 to 84 mm.). AAF SAM Proj 21-1201-0008, Report no. 2.

METALS AND METAL PRODUCTS

Application of fluid flow principles to gating copper-base castings, by John T. Robertson and Russell G. Hardy. U. S. Naval Research Laboratory. Oct 1945. 32p photos, drawings, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109503

The effect of diameter and height of gates on the velocity of flow of "G" bronze has been investigated with regard to control of the laminar or turbulent condition of the metal entering the mold. In composition "G" there was little dross formation even in turbulent metal, but in aluminum bronze and manganese bronze dross was avoided only by streamline flow. Aluminum bronze cast with streamline flow had uniformly high mechanical properties. The same alloy cast with turbulent flow had wide variation in tensile strength and in elongation. The variations in mechanical properties were due to dross inclusions which were present throughout the casting. NRL M-2658.

British pressed metal industry. Report of a productivity team from the United States of America which visited the United Kingdom in 1951. Anglo-American Council on Productivity. May 1953. 50p photos drawings, map Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 106476

1. Metal industires - Gt. Brit. 2. Dies - Punching - Gt. Brit. 3. Tools, Machine - Design - Gt. Brit. 4. Presses, Forming - Design - Gt. Brit.

Calculation of the tensile strength of normalized steels from their chemical composition, by F. M. Walters, Jr. U. S. Naval Research Laboratory. Jun 1942. 24p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109564

The tensile strength of normalized steels may be computed from the chemical composition by means of factors. The effect of many alloying elements is independent of the others present. NRL M-1888.

Causes of porosity and leakage in non-ferrous castings. U. S. Naval Research Laboratory. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

Progress report Feb 1944 to Sep 1944, by John T. Robertson, Ralph L. Fox, Russel G. Hardy. Nov 1944. 20p photos, diagrs, table Microfilm $1.75, Photostat $2.50. Limited supply available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.50. PB 109518

Five air ram cylinders of an aluminum-silicon-copper alloy were cast with various foundry techniques. Three of the castings passed the specified pressure test of 300 pounds per square inch maintained for five minutes, and showed no leakage when pressures as high as 750 pounds per square inch were applied. Complete details of the foundry procedures and hydrostatic testing are given. NRL M-2397.

Distribution of mechanical properties in sand cast bronzes, by Ralph H. Brouk and Russel G. Hardy. Sep 1944. 23p photos, drawings, graphs, tables Microfilm $2.00, Photostat $3.75. PB 109534

The mechanical properties of various bronze alloys were investigated with test bars from heavy castings and separately cast coupons. The tensile strength of compositions G, M and Red Brass was approximately 10,000 p.s.i. lower in the center of a section three inches in thickness than in the separately cast coupon. Nickel-tin bronzes containing three per cent nickel had much more uniform characteristics; and when cast with a low pouring temperature, the mechanical properties at the center of the three inch section were nearly equal to the properties of the separately cast coupon. NRL M-2374.

The effects of nickel, zinc, and lead on the mechanical properties of nickel-tin bronze containing five percent tin. Progress report, by Ralph L. Fox, Ralph H. Brouk and Blake M. Loring. Aug 1944. 23p photos, graphs (2 fold), tables Microfilm $2.00, Photostat $3.75. PB 109444

1. Bronze castings - Leakage 2. Bronze castings - Porosity 3. Metals, Non-ferrous - Castings 4. Bronze-nickel-tin alloys - Mechanical properties 5. NRL M-2357.

Combined-stress fatigue strength of 76S-T61 aluminum alloy with superimposed mean stresses

and corrections for yielding, by William N. Findley. U. S. National Advisory Committee for Aeronautics. May 1953. 90p photos, diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109661

1. 76S-T61 (Aluminum alloy) 2. Aluminum alloys - Stresses 3. Aluminum alloys - Fatigue tests 4. Illinois. University, Urbana, Ill. 5. NACA TN 2924.

Creep of single crystals of aluminum, by R. D. Johnson, F. R. Shober and A. D. Schwope. U. S. National Advisory Committee for Aeronautics. May 1953. 51p photos, diagrs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109664

1. Aluminum - Creep tests 2. Extensometers - Design 3. Metals - Creep - Testing equipment 4. Plastic deformation - Theory 5. Battelle Memorial Institute, Columbus, Ohio 6. NACA TN 2945.

Determination of the optimum conditions for the seam welding of 0.031 inch monel sheet, by Gerald M. Slaughter. Jan 1949. 23p photos, diagr, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109657

The primary variables in this process are electrode force, timing cycle, wheel speed, welding current, and treatment of the surfaces of the sheets. By independently varying one and holding all others constant it was possible to determine the optimum set of values for the variables. The optimum conditions were found to be a timing cycle of 2 cycles "on" and 4 cycles "off", 1600 lb minimum electrode pressure, and wheel speed of 9 welds per in. A large current range between expulsion on the one hand and insufficient fusion on the other was found to be a good criterion for the establishment of optimum welding conditions. Thesis-Rensselaer Polytechnic Institute.

Effect of boron trichloride gas, tin, lead and iron on the grain size and mechanical properties of manganese bronze, by William J. Richmond. U. S. Naval Research Laboratory. Sep 1944. 16p photo, graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109519

The grain size of manganese bronze is decreased by boron trichloride gas, tin, lead and iron. The most practical method for the control of the grain size, however, is the addition of iron to the manganese bronze. Boron trichloride is expensive, difficult to handle in the foundry and rather weak in grain refining action unless an excessive volume of the gas is used. Both tin and lead decrease the ductility when present in percentages sufficient to decrease the grain size, while iron increases the ductility. NRL M-2391.

Effect of prestraining on recrystallization temperature and mechanical properties of commercial, sintered, wrought molybdenum, by Kenneth C. Dike and Roger A. Long. U. S. National Advisory Committee for Aeronautics. Jul 1953. 25p photos, diagr, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110461

1. Molbdenum - Swaging 2. Molybdenum - Recrystallization - Effect of prestraining 3. Molybdenum - Mechanical properties - Effect of prestraining 4. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 5. NACA TN 2973.

Effects of tin and lead on manganese bronze. Dezincification of manganese bronze, by A. H. Hesse, E. T. Myskowski, B. M. Loring. U. S. Naval Research Laboratory. Jul 1943. 30p photos, diagr, graphs (1 fold), fold tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109540

The effect of lead and other elements on manganese bronze has been studied in detail, especially in regard to the changes in mechanical properties and resistance to dezincification that may result from furnace charges of contaminated scrap metal. There appears to be little tendency for lead segregation in a well made manganese bronze. More lead may be permitted if the copper-zinc ratio and the tin content are carefully controlled. Tin appears to be one of the best inhibitors of dezincification. Silver, phosphorus, arsenic, and lead are in general effective to a certain extent. Antimony not only decreases ductility seriously but also tends to increase the dezincification. NRL M-2131.

Electrodeposition of chromium alloys, by Alfred Taboada. Jun 1952. 36p photos, diagr, graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109859

Beginning with desired alloying additions in aqueous solution, experimental investigations were made of chemical forms, concentrations, and of plating conditions in an attempt to deposit low-alloyed plates. Various iron and nickel salts were investigated and of these the sulfates and ammonium sulfates were selected as the most likely to give the desired results. The alloyed plates were examined for such physical properties as hardness, adherence, ductibility, and for cracked structure in an attempt to evaluate each plate with respect to other chromium and chromium-alloy plates. Some pages may not reproduce well.

Experimental evidence of non-linearity in plastic stress-strain relations, by F. D. Stockton. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. May 1953. 58p diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 109644

Part I. The most general plastic stress-strain relation for materials obeying Drucker's work-hardening criteria is specialized to commonly used forms. Particular attention is paid to the implications incurred by (a) the assumption of a loading function for these materials, and by (b) the assumption of the linearity of plastic strain increments in the stress increments. Part II. Experimental evidence. Contract N7onr-35801, T. O. I, NR-041-032. GDAM A11-88/50. GDAM TR88.

Fundamental investigation of the flash welding of aluminum alloys. Rensselaer Polytechnic Institute. Dept. of Metallurgical Engineering, Troy, N. Y. Final report under Contract no. W-33-038-ac-17624, by W. F. Hess, R. M. Curran, P. Patriarca. Mar 1948. 114p photos, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $4.75, Photostat $15.00. PB 109819

This investigation was made to obtain information of a fundamental nature regarding temperature distributions and the effect of the various variables of the flash welding process. Temperature distribution curves were determined in 14S-T, 24S-T, and 61S-T aluminum alloys using specimens 2 in. wide and 6 in. long in the 0.250 and 0.188 in. thicknesses. Measurements of the power input to the flash welder were made in conjunction with the temperature measurements, to determine the effect of secondary voltage, section size, flashing velocity, and alloy content on the power requirements.

Galvanic corrosion theory for adherence of porcelain-enamel ground coats to steel, by D. G. Moore, J. W. Pitts, J. C. Richmond and W. N. Harrison. U. S. National Advisory Committee for Aeronautics. Jun 1953. 19p photos, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109640

1. Steel - Coatings, Ceramic - Chemical reactions 2. Coatings, Ceramic - Adherence 3. U. S. National Bureau of Standards 4. NACA TN 2935.

Impact properties of commercially available steels at high hardness levels, by Walter Speyer. Tour, Sam, & Co., Inc., New York, N. Y. Dec 1949. 25p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109858

Only steels, which could be used in hand tools, were considered. A change to an impact specimen (SAE 450 steel) was made, which is more economical to prepare, yet shows the same transition zone as the specimens used previously. All test specimens were heat-treated in a similar manner and impact tested at room temperature, -40°, and -80°F. The alloys using manganese, silicon, and molybdenum, alone or in combination, were found to offer improvements in impact strength over plain carbon steels. Contract no. W-440109-gm-2122. R.7139. P.228.

Influence of melting practice, design of test coupon and molding sand on the mechanical properties of nonferrous test bars, by W. J. Richmond and R. L. Fox. U. S. Naval Research Laboratory. May 1946. 31p photos, drawing, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109533

The effects of three types of molding sand and six types of tensile test specimens have been investigated with five hundred pound heats of bronze melted under controlled conditions. The heats were melted in an oil fired furnace and poured at 1200°C. The molding sand has a more pronounced effect in the mechanical properties than either the design of the test coupon, the casting-to-size or the machining. NRL M-2821.

Investigation of alternates of tin for metallic coatings for radio hook-up wires, by J. B. Russell. U. S. Naval Research Laboratory. Jan 1945. 53p photos, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 109528

1. Tin - Substitutes 2. Wire, Copper - Coatings 3. Coatings, Lead 4. Coatings, Metallic 5. NRL M-2476.

Investigation of short column formulae as applied to aluminum angles, by Frank M. Clancy, Jr. 1949. 46p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109654

Tests were made on 61S-T6 and 24S-T aluminum alloy columns having angular cross sections in an attempt to select or develop a satisfactory formula to overcome short column failure conditions. Torsional failures occurred prior to over-all column action where wall thickness was small; but where the wall thickness was sufficiently large, column failures occurred without torsional deflection. In general, the straight line short column formula proved to be the most accurate and easiest to apply. It is believed possible to predict the failures of any aluminum alloy angular column knowing only the yield stress and the modulus of elasticity. Thesis-Rensselaer Polytechnic Institute.

Investigation of the effect of fatigue on the tensile properties of cold rolled steel bars, by Dirk Perper. Jun 1949. 54f photos, diagr, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Enlargement Print $8.75. PB 109763

Test results showed that for about half the fatigue range, there is no indication of fatigue damage, however, from there on the fractures show decided evidence of fatigue. Flat spots found on the fractures in the second half of the range possibly are cracks but these may be brittle areas that open up upon application of tensile stress on the bar. The tensile breaking load curve drops off slightly with increase in size of the flat spots. Thesis-Rensselaer Polytechnic Institute.

Investigation of the influence of sintering variables on the crystal structure and magnetic properties of the oxide magnet, Vectolite, by Thom P. Davis. Jun 1949. 78p photos, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.50, Photostat $10.00. PB 109656

The study indicated that the raw materials of Vectolite (CoO, Fe_2O_3 and Fe_3O_4) do not essentially change in structure prior to sintering. Upon sintering, a mix-crystal solid solution $CoFe_2O_4$ is formed above 1100°C, which is retained at room temperature by adequate fast cooling. A Fe_2O_3 phase will reappear upon heating of this supersaturated solid solution. The coercive force was found to be more dependent upon the rate of cooling from the sintered temperature than on the time at sintering temperature. Thesis-Rensselaer Polytechnic Institute.

Investigation of the phenomenon of cleavage type fractures in low alloy structural ship steels, by H. J. Gershenow and C. E. Hartbower. U. S. Naval Research Laboratory. Mar 1946. 19p photos, drawing, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109501

Tensile tests of two types of flat bar specimen were made which substantiated the supposition that various combinations of temperature and constraint can produce brittle fractures in a normally ductile steel by simple tension loading. It was shown that high constraint at room temperature, less constraint at moderately low temperatures, and no constraint other than that inherent in a conventional tensile specimen at very low temperatures will produce brittle failures. NRL M-2788.

Investigation of the rate of reduction of tungsten ore with hydrogen, by Harold M. Belkin. Jun 1950. 83p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 109834

The rate at which water was evolved was utilized as a measure of the rate of this reaction since the over-all chemical reaction yields H_2O as the only gaseous product. The reaction was performed in a specially constructed reactor through which heated hydrogen was passed at a controlled flow rate over peletized tungsten ore. Analyzed H_2O temperature-condensation data showed that the reaction rate was faster for a smaller size pellet than for a larger one. Thesis-Rensselaer Polytechnic Institute.

Low expansion alloys. U. S. Naval Research Laboratory. Summary report, 1 Dec 1939-1 Jun 1941, by L. R. Kramer. Jun 1941. 31p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109516

While the low expansion iron-nickel cobalt alloys have adequate mechanical properties and reasonable resistance to corrosion in air and steam, it has been found that these alloys are unstable in the temperature range 360 to 540°C. A partial transformation of austenite to ferrite results in an increase in length and a change in the coefficient of expansion, usually an increase. NRL M-1751.

NRL shock-fracture test for welded joints in connection with qualification of Union-melt welding of STS armor. U. S. Naval Research Laboratory. Fourth partial report, by F. S. McKenna and F. H. Laxar. Jan 1945. 23p photos, drawings, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109524

1. Armor plate - Welding - Tests 2. Welds - Impact tests 3. Unionmelt process (Welding) 4. NRL M-2453.

Operation of Thompson molybdenum plant. Final report under Contract W-33-038-ac-20672, prepared by E. G. Pekarek. Thompson Products, Inc., Cleveland, Ohio. Jan 1952. 59p photos, drawings, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 109764

This final report discusses three separate phases of the work on molybdenum, namely; the initial program which led to the decision to make the investigation; the description of the Molybdenum Plant equipment and details of the standard procedure established; and the refinements of the process which were investigated and the conclusions reached.

Polarographic analysis of aluminum in steel, by James M. Dugan. Jun 1949. 37p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109658

The principles of polarographic analysis are briefly outlined and a schematic representation of the circuit used is included. This method gives a simplified procedure for the analysis of aluminum in steel when the aluminum is present in amounts of one-tenth of one per cent or greater. At percentages less than this, however, it is not applicable without modification of the separation procedure. The method is entirely free of the usual interferences encountered because of the specific nature of the polarographic half-wave potential. Thesis-Rensselaer Polytechnic Institute.

Preparation and spectrographic analysis of magnesium-zinc-manganese-silver alloys containing 0.0 to 0.3 per cent calcium, by W. G. Ettinger. Jan 1949. 30p diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109659

Seven magnesium alloys containing 5% zinc, 1.5% manganese, and 1.0% silver, with additions of 0.0 to 0.3% calcium were prepared. Three of the alloys were melted using Dow Flux 220, the remaining four using Dow Flux 310. A spectrographic analysis was made of the alloys, using both the solution method and metallic electrodes. The results obtained with the solution method were low, due to the small calcium concentrations involved and the difficulty in obtaining standards, gave results which were of the same order of magnitude as the nominal calcium additions and appeared to be reliable. Thesis-Rensselaer Polytechnic Institute.

Recouvrement par voie electrolytique du fer par le titane (Titanium electroplating of iron). Second part. n.d. 14p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109652

The problem of electrolytic deposit of tungsten and chromium is discussed. The process of obtaining metallic tungsten through electrolysis was studied. Two means were used to prevent the formation of hydrates and eventually to deposit the metal, namely: to use tungsten salts in complex form in aqueous solutions; and to use organic solvents. These processes were tried and details are given in the report. Translated from the French original by Armed Services Technical Information Agency Document Service Center. Declassified 21 Oct 1952.

Research on the weldability of iron alloys (weldability tests of nickel steels), by Clarence E. Jackson, George G. Luther, Myron A. Pugacz. U. S. Naval Research Laboratory. Aug 1941. 71p photos, drawings, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.50, Photostat $10.00. PB 109542

1. Iron alloys - Welding 2. Steel, Nickel - Welding - Tests 3. NRL M-1770.

Solubility of iron in sodium metal, sodium-sodium oxide, and sodium-sodium oxide-sodium hydroxide, by Andrew D. Bogard. U. S. Naval Research Laboratory. Mar 1953. 11p diagr, graphs, tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.50. PB 111180

The solubility of iron in sodium metal has been determined across the temperature range 236°-540°C in a static system using 46.3-day Fe 59 as a tracer. Sodium monoxide, across a similar temperature range increases the solubility of iron in sodium metal by a factor of approximately 10. The combined effect of sodium monoxide and sodium hydroxide increases the solubility by another factor of approximately 10 across the temperature range 250°-560°C. It was found that impurities in the iron undetectable by chemical or spectroscopic methods appeared in the sodium metal. NRL R4131.

Spectrophotometric determination of titanium in steels, by A. Weissler. U. S. Naval Research Laboratory. Dec 1944. 36p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.00. PB 109538

This report presents improved methods for the hydrogen peroxide spectrophotometric determination of titanium in iron, steel, vanadium steel, and stainless steel, which involve no separations of the titanium or bleaching with hydrofluoric acid. A procedure of analysis for metallic and combined titanium in steel is described. An interesting application of the spectrophotometer is the simultaneous determination of titanium, vanadium, and molybdenum in perchloric acid solution by hydrogen peroxide. Also included are the absorption spectra on which these methods are based. NRL M-2436.

Stress relief of gray cast iron, by J. H. Schaum. U. S. Naval Research Laboratory. Jun 1948. 25p photos, drawings, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 109572

Stress relief studies showed that (1) rate of stress relief is most rapid during the first hour at temperature, (2) rate of stress relief is very slow below 1000°F but increases as temperature is raised, and (3) initial stress and alloy composition have an important influence on the rate of stress reduction by heat treatment. NRL M-3296.

Studies and experimental investigations for the development of phase diagrams of the titanium-chromium and titanium-copper alloy systems. Massachusetts Institute of Technology. Dept. of Metallurgy. Contract AF 33(038)-8754. AAF TR6595. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number for each part ordered.

Part I, by Frank B. Cuff, Jr., Arnold S. Joukainen, Lee S. Richardson, John C. Nicholls. Nov 1951. 65p photos, drawings, graphs, tables Microfilm $3.00, Photostat $8.75. PB 109702

The titanium-chromium binary system has been partially completed in the range from 0 to 63 percent chromium, using high purity (99.7 percent) sponge titanium and electrolytic chromium. A preliminary diagram has been drawn of the titanium-copper system from x-ray and metallographic investigations.

Part II: Titanium-copper and the titanium-chromium phase diagrams, by Arnold S. Joukainen and Frank B. Cuff. Dec 1951. 47p photos, graphs,

table Microfilm $2.50, Photostat $6.25. PB 109703

The titanium-copper system was found to contain four intermetallic compounds: Ti_2Cu, TiCu, Ti_2Cu_3 and $TiCU_3$. It is an eutectoid type system offering heat treatment possibilities due to a suppression of the alpha to beta transformation. The titanium-chromium system was of particular interest because of the improved properties imparted to titanium by small chromium additions. It was found that a continuous series of solid solutions existed between titanium and chromium. An intermetallic compound, $TiCr_2$, which decomposes upon heating, was found at 60 to 65 weight percent chromium. At the titanium end of the diagram there is an eutectoid type of reaction at 15 weight percent chromium.

Studies on the causes and methods of preventing bore cracks in cast steel fittings and valve bodies, by Harold F. Bishop and William H. Johnson. U. S. Naval Research Laboratory. Sep 1945. 49p photos, drawing, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109536

1. Steel castings - Cracking 2. Valves - Cracking 3. NRL M-2637.

Study of the performance of various metals as igniter contact rings on the five inch SSR Rocket motor, by W. C. Sierichs and T. P. May. U. S. Naval Research Laboratory. Oct 1945. 29p photos, drawing, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109889

Fourteen metals were examined with respect to the influence of exposure on their electric contact resistances. None of these bare metals performs with satisfaction after exposure to high humidity and to salt spray. Several organic coating materials were also investigated to determine whether they improve the performance of these metals. NRL P-2671.

Study of the working and annealing characteristics of N.E.C. electrolytic tough pitch copper, by Donald Ernest Pardon. Jun 1949. 91p photos, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microdilm $4.25, Photostat $12.50. PB 109655

Eight different combinations of ready-to-finish anneals and final reductions were investigated, utilizing anneals of 300, 600 and 800°C and final reductions of 37.2, 60.5 and 80.2% corresponding to 4, 8, and 14 B&S numbers hard, respectively. The final anneals ranged from 150 to 900°C. The ready-to-finish anneals have a great influence on the hardness resulting from cold work, that is, hardnesses cannot be predicted definitely on the basis of the final cold working alone. The greatest effect of increasing the annealing time is in the recrystallization range. Lower hardnesses will result from an increased annealing time in this range. Thesis-Rensselaer Polytechnic Institute. Some pages may not reproduce well.

Substitute solders of 85-15 lead-tin type, by J. B. Russell and J. O. Mack. U. S. Naval Research Laboratory. May 1944. 62p photos, drawings, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 109508

1. Solders, Lead-tin - Physical properties 2. Tin - Substitutes 3. NRL M-2302.

System for controlling the speed of an aluminum extrusion, by Stanley D. Kahn. May 1952. 82p photos, drawings, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 109818

A laboratory analog of the industrial process was constructed and analyzed. A conversion from the laboratory analog to the industrial application is discussed. Thesis-Rensselaer Polytechnic Institute.

Titanium nitride cermets, by Frederick K. Davey, Ernest R. Glabau, G. Edwin Lorey. New Jersey Ceramic Research Station, Rutgers University, New Brunswick, N. J. Jul 1952. 33p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109701

Several compositions of cermets based on titanium nitride were investigated. The ceremts were tested for strength in cross bending, resistance to oxidation, and resistance to thermal shock. The differences of the various compositions are noted as well as the effect of different processing techniques. Titanium nitride cermets containing chromium as the metal phase were found to have the best properties of the compositions investigated. Contract W33-038-ac-15800. AAF WADC TR 52-155.

Ueber die härte von hartchromschichten (On the hardness of hard chrome coatings), by Heinrich Arend. May 1953. 16p graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109732

Translated and edited by F. A. Raven from Metalloberfläche, ausgabe B, vol. 3, no. 5, 1951, p. B72-B76.
1. Coatings, Chromium - Hardness - Germany 2. Plating, Chromium - Germany 3. NAVSHIPS T525 4. STS 170.

Value of pressure tests and radiographs of gun metal castings, by W. H. Baer. U. S. Naval Research Laboratory. Mar 1948. 23p photos, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 109748

Cast gun metal plates 1 in. x 8 in. x 6 in. of composition 88 Cu - 8 Sn - 4 Zn, containing defective areas, were investigated by radiography and tested under hydrostatic pressure. Radiographs of castings that were pressure-tight and castings which leaked are shown. It was concluded that castings intended for critical use should be radiographed as well as pressure tested. NRL M-3254.

Weldability of cast chromium-molybdenum steels for service in steam lines at 950°F, by Myron A. Pugacz and John A. Rinebolt. U. S. Naval Research Laboratory. Jun 1949. 24p photos (1 fold), diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 109816

Investigation of pre- and postheat temperatures requisite for welding specific types of chromium-molybdenum cast steels such as are used in high-temperature steam lines. It was found that a preheat of 300° -500°F is required to prevent weld-metal and underbead cracking, and temperatures in the range of 1250° -1350°F are satisfactory for postheats. With these preheat and postheat treatments, cast chromium-molybdenum steels (0.18-0.26% C, 0.38-0.62% Cr, 0.42-0.67% Mo) are readily weldable and develop good ductility. NRL M-3474.

Weldability tests of high tensile steel (BuShips welding tests no. 324 and no. 325) Partial report. Tests and report by G. G. Luther, F. S. McKenna, F. H. Laxar, J. H. Goodyear, K. E. Fritz. U. S. Naval Research Laboratory. Jul 1944. 45p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109507

A comparison is made of the relative weldability of nine manganese-titanium steels, a manganese-vanadium steel and a mild steel. The direct ductility tests, the nick-bend and T-bend, classify these steels in approximately the same order of weldability. The indirect tests show a greater variation. The low weldability rating obtained for manganese-vanadium steel cannot be taken as indicative of the performance of this type of steel. The effect of titanium on the weldability of a steel cannot be determined from these tests. NRL M-2325.

X-ray investigation of the lattice constants of the MG-LI binary and the MC-LI-ZN ternaries at room temperature, by Peter L. Lansing. Rensselaer Polytechnic Institute, Troy, N. Y. Jun 1949. 33p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109653

A method has been devised for the preparation of powdered magnesium-lithium base alloys for X-ray diffraction at elevated temperatures. It was found that a specimen of uniform diameter and approximately two inches long could be obtained by mixing the powdered alloys with Collodian or Glyptal as a binder and extruding the paste through a 0.5 mm-die opening.

METEOROLOGY AND CLIMATOLOGY

Central Pacific project. Seventh and final report under Contract no. AF19(122)-414, by Clarence E. Palmer. California. University. Institute of Geophysics. Mar 1953. 22p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109623

1. Stratosphere - Research 2. Clouds - Photography 3. Cyclones, Tropical - Effect of solar radiation 4. Atmosphere, Upper - Research.

Collection of Hungarian and English meteorological terms and grammatical endings. First provisional draft, compiled by G. T. Thuronyi. American Meteorological Society. Meteorological abstracts and Bibliography, Washington, D. C. Feb 1953. 117p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $4.75, Photostat $15.00. PB 109775

Contract AF 19(604)-302.
1. Hungarian language Glossaries, vocabularies, etc. 2. Meteorology - Dictionaries.

International symposium on atmospheric turbulence in the boundary layer, Massachusetts Institute of Technology, 4-8 Jun 1951, edited by E. W. Hewson. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate, Cambridge, Mass. Dec 1952. 528p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $9.00, Photostat $62.50. PB 109853

Organized jointly by the Dept. of Meteorology of the Massachusetts Institute of Technology and the Geophysics Research Directorate of the Air Force. Cambridge Research Center under Contract no. AF 28(097)-7. Contents: 1. The present position in its broad outlines. Chairman: E. W. Hewson. - 1.1 Some unsolved problems in the physics of the earth's boundary layer, by O. G. Sutton.-1.2. Atmospheric turbulence in the boundary layer, an appraisal of the present position, by C.H.B. Priestly. 1.3. The present position of selected turbulence problems in the atmospheric boundary layer, by H. Lettau.-2. Problems of evaporation and of the air-ocean interface. Chairman: C. W. Thornthwaite.-2.1. The relationship between wind structure and turbulence near the ground, by M. H. Hallstead.-2.2. The present position of the study of exchange across the ocean-atmosphere interfaces, by R. B. Montgomery.-2.3. The roughness of the air-sea boundary, by W. H. Munk.-2.4. Streaks of natural water surfaces, by H. Stommel.-3. The structure of turbulent flow. Chairman: J. E. Miller.-3.1.

Current research at Imperial College, London, on the structure of turbulent flow, by P. A. Sheppard. - Method for determining the parameters of turbulent flow through the whole vertical extent of the boundary layer, by E. W. Hewson.-3.3. Micrometeorological instrumentation at MIT's Round Hill field station, by G. C. Gill.-3.4. Preliminary results of a program for measuring the structure of turbulent flow near the ground, by H. E. Cramer.-3.5. The IMFL anemoclinometer, an instrument for the investigation of atmospheric turbulence, by A. Martinot-Lagarde, A. Fauquet and F. N. Frenkiel.-3.6. The vertical momentum flux at Brookhaven at 109 meters, by H. A. Panofsky and R. A. McCormick.-3.7. Locally isotropic turbulence in the lower layers of the atmosphere, by R. J. Taylor.-3.8. Technique for measuring the detailed structure of atmospheric flow, by J. G. Edinger.-3.9. Measurement, analysis and interpretation of turbulent temperature fluctuations, by J. E. McDonald.-3.10. Recording and automatic tabulation of continuously varying statistical data, by A. R. Kassander, Jr. and R. M. Stewart, Jr.-3.11. A photographic technique for analyzing turbulent motions of air, by J. E. Miller.-3.12. Turbulence research at W. H. O.L, by A. F. Bunker.-3.13. Recognition of the presence of convective currents within a non-saturated turbulent layer of the atmosphere, by A. F. Bunker.-4. Effects of turbulent flow. Eddy fluxes. Chariman: C.H.B. Priestley.-4.1. Investigations of the vertical exchange within the lowest decameters at Quickborn, by E. F. H. Frankenberger.-4.2. Current research at Imperial College, London, on the effects of turbulent flow, eddy fluxes, by P. A. Sheppard.-4.3. Measurement of the vertical transfer of heat, water vapor and momentum by eddies in the lower atmosphere with some results, by W. C. Swinbank.-4.4. Recording computer for the direct measurement of the turbulent heat exchange in the atmosphere, by D. Parson, Jr. and A. F. Bunker.-4.5. Remarks on atmospheric turbulence research at the University of California, Los Angeles, by H. F. Poppendiek and J. E. Vehrencamp. -5. Effect of turbulent flow. Eddy diffusion. Chairman: P. A. Sheppard.-5.1. On the Lagrangian correlation coefficient for turbulent diffusion and its application to atmospheric diffusion phenomena, by E. Inoue.-5.2. On the statistical theory of turbulent diffusion, by F. N. Frenkiel.-5.3. On eddy diffusion in shear zones, by H. Lettau.-5.4. Eddy diffusion from elevated sources, the Brookhaven experience, by P. H. Lowry.-5.5. Field studies of turbulence and diffusion, by F. A. Record.-5.6. General discussion.-6.7. General discussion.-8. Recommendations, by the Chairman, E. W. Hewson. AAF GRD P19. AAF CRC TR53-9.

Modification of rain in showers with time, by E. Caroline Rigby and J. S. Marshall. McGill University. MacDonald Physics Laboratory. "Stormy Weather" Research Group. Mar 1953. 43p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109625

Contract no. AF19(122)-217. Scientific report MW-10.
1. Drops, Liquid - Size - Measurement 2. Raindrops - Measurement 3. Radar - Meteorological effects.

On the relation between vorticity, deformation and divergence and the configuration of the pressure field, by Sverre Petterssen. Chicago. University. Dept. of Meteorology. Apr 1953. 17p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109896

Technical report no. 1 under Contract no. AF 19(604)-390.
1. Vortex motion - Theory 2. Deformation - Theory 3. Divergence - Theory 4. Atmosphere - Pressure 5. Equations of motion.

Project Cirrus. Final report under Contract no. DA-36-039-sc-15345. Part II: Analysis of the effects of periodic seeding of the atmosphere with silver iodide, by Irving Langmuir. General Electric Co. Research Laboratory, Schenectady, N.Y. May 1953. 349p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $9.00, Photostat $43.75. PB 110467

Dept. of the Army project: 3-90-07-022. Signal Corps project: 24-172 B-O.
1. Clouds - Seeding 2. Silver iodide - Use in cloud seeding 3. Meteorological research 4. SIG Contract DA36-039-sc-15345, Final report, part II. 5. GE RL 785 Part II.

Reduction of measured coronal intensities to true intensities, by James W. Warwick. Harvard University. Harvard College Observatory. Solar Dept. Mar 1953. 22p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109619

Contract AF19(604)-146.
1. Corona - Mathematical analysis 2. Corona discharges - Measurement 3. HU HCO SR5.

MINERALS AND MINERAL PRODUCTS

Concrete products plant, by William C. Frank. Jan 1951. 67p drawings Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 109820

Preliminary considerations are determination for the size of the plant and the selection of the site. Such a plant should be located in a section where both rail and water transportation are available. Further development of the design is based on the traffic flow, speed of manufacturing, and economy of design. Thesis-Rensselaer Polytechnic Institute.

Determination of progressive corrosion of glass tank refractories, by Paul G. Herold and Ved Prakash Maheshwary. Missouri. University. School of Mines and Metallurgy, Rolla, Mo. Dec 1952. 30p photos, diagrs, graphs, tables

Available from University of Missouri, School of Mines and Metallurgy, Rolla, Mo. PB 109645

Bulletin, technical series no. 82.
1. Glass - Refractive index 2. Refractory materials - Corrosion 3. Coatings, Glass - Corrosion.

Identification of certain clays by differential thermal analysis, by Francis Paul Bystrowski. Jun 1949. 87p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 110484

Most clays consist essentially of minute particles of one or more of the clay minerals - kaolinite, montmorillonite and illite groups being the most important. The clay minerals occur in flake-like shaped particles, possess base-exchange capacity, and exist in or are reducible to extremely small grain sizes on working with water. From the results of qualitative and quantitative analyses, a definite conclusion can be drawn as to the identification of the various mixtures and unknowns analyzed. Although the quantitative analysis did not give definite results, the qualitative analysis gave results which could be associated with those of the master working curves for the pure minerals. Thesis-Rensselaer Polytechnic Institute.

Mechanical property tests on ceramic bodies. Battelle Memorial Institute, Columbus, Ohio. Bimonthly progress report no. 1, period Nov 18, 1949 to Jan 18, 1950, under Contract no. AF 33(038)-8682, by J. K. Johnston, S. J. Stockett, W. H. Duckworth, A. D. Schwope and H. J. Schofield. Jan 1950. 8p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109762

Progress is reported on research directed toward increasing the knowledge of the load-bearing characteristics of ceramic bodies. A brief outline of earlier work, which was concerned with a technical porcelain, is given. Emphasis was placed on necessary measures preparatory to the actual testing of the K138A titanium carbide body. Design studies of bending and torsion specimens were made, and specimen grips for the high-temperature tensile tests were evolved. A testing furnace was set up and heat trials were conducted. Laboratory work was started on the development of a capacitance-type extensometer which would not be affected by high temperatures.

Perforated clay bricks. Gt. Brit. Dept. of Scientific and Industrial Research. Building Research Station, Watford, Eng. Apr 1953. 4p photos, table Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.10. PB 109800

S. O. code no. 72-22-0-53.
1. Bricks, Clay - Perforated - Gt. Brit. 2. DSIR BRD 53.

PACKING AND PACKAGING

Evaluation of aluminum drums as containers for Chemical Corps bleach, by Donald S. Greif. U. S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Mar 1953. 9p photo, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109717

Project 4-91-06-001.
1. Containers, Aluminum - Tests 2. Containers, Steel - Tests 3. Containers, Chemical - Tests 4. Bleaching agents - Corrosive effects 5. CC CRL R65.

PERSONNEL APTITUDE TESTING

Demonstration of retroactive interference in pursuit rotor learning, by Abram M. Barch. Iowa State University, Iowa City, Iowa. Dec 1951. 18p photo, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 108800

Contract Nonr-166(00), Project NR-783-002. SDC Human engineering project 20-M-1e.
1. Learning - Theory 2. Psychology, Applied 3. Psychomotor tests 4. Epicyclic Pursuit Rotor 5. SDC TR 166-00-1.

Spatial error gradients in motor learning and transfer, by Carl P. Duncan and Benton J. Underwood. Northwestern University, Evanston, Ill. Apr 1953. 15p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109900

Learning of, and transfer between, two perceptual-motor paired-associates tasks were studied by means of a detailed examination of errors. Contract no. AF33(038)-11396. AAF WADC TR53-65.

Study of verbal mediation as a factor in transfer of training, by Gordon A. Eckstrand and Ross L. Morgan. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1953. 32p diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109899

This study investigated one technique of producing transfer between tasks involving physically dissimilar sets of stimuli. Experimental data collected at Ohio State University under Contract no. AF18 (600)-78. AAF WADC TR53-34.

PHOTOGRAPHIC AND OPTICAL GOODS

Colouration of some optical glasses by X and gamma radiation, an A.E.R.E. report, by J.V.F. Best. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Mar 1953. 19p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.75. PB 109801

HD 866. S. O. code no. 70-674-1-37. Survey of American experience, p. 5-6.
1. Atomic power - Research - Gt. Brit. 2. Glass, Optical - Coloration by radioactive substances - Gt. Brit. 3. Lenses, Optical - Coloration by radioactive substances - Gt. Brit. 4. Lenses, Periscope - Coloration by radioactive substances - Gt. Brit. 5. Gamma rays - Absorption - Gt. Brit. 6. X-rays - Absorption - Gt. Brit. 7. Radioactive substances - Protection - Gt. Brit. 8. AERE C/R 1125.

Point-source binormal lens with wide-angle focal points, by Ellen Fine and George E. Reynolds. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate, Cambridge, Mass. May 1953. 20p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109907

1. Lenses, Electromagnetic - Design 2. AAF CRL E5095 3. AAF CRC TR 53-13.

PHYSICS

General

Diffraction theory, a critique of some recent developments, by C. J. Bouwkamp. New York University. Washington Square College of Arts and Science. Mathematics Research Group. Apr 1953. 95p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $4.25, Photostat $12.50. PB 109893

A number of recent developments in the theory of diffraction of electromagnetic waves, particularly those dealing with apertures in plane conducting screens, are reviewed. The subjects treated include modifications of Kirchhoff's theory, the theory of small apertures, Babinet's principle for plane obstacles, variational principles, and singularities at sharp edges. For completeness, a discussion from an alternative viewpoint of the problem of diffraction by an aperture by Professor N. Marcuvitz has been included in this report. Research report no. EM-50. Contract no. AF-19(122)-42.

Manual for moving polynomial arc smoothing, by John K. Sterrett. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Nov 1952. 239p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $8.25, Photostat $30.00. PB 109844

The four moving polynomial arc techniques for adjustment of observed data using (1) Data Multipliers, (2) Power Moments, (3) Factorial Moments and (4) Central Differences are presented with appropriate revisions, standardizations, and extensions to make them more adaptable to high speed calculating machines. Additional techniques developed include (1) Recursion Fraction Technique using Orthogonal polynomials and (2) Triple Moving Average Technique using more than one adjusted value from each separate fitting of the polynomial arcs. Extensive sets of tables for use with the described tehniques are compiled and given in the appendix. An organized bibliography of 500 references on the development, application, and testing of moving polynomial arc and related techniques is included. APG BRL R840.

Laminar flow about very slender cylinders in axial motion, including the effect of pressure gradients and unsteady motions, by R. D. Cooper and M. P. Tulin. U. S. David W. Taylor Model Basin. Apr 1953. 33p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109615

The effect of transverse curvature on laminar boundary layer characteristics has been investigated through the use of an approximate, linearized theory. In the case of a cylinder in steady, axial motion with no external pressure gradient, it is shown that the transverse curvature increases the wall shear stress. A general solution is obtained for the case of arbitrary unsteady motion of a cylinder initially at rest with no external pressure gradient. The particular case of an impulsive start is considered in detail. The effect of external pressure gradients in the case of steady motion is investigated, and general solutions for a large class of external pressure gradients are obtained. The particular class of Falkner-Skan type pressure gradients are treated in detail. DWTMB 838.

Numerical solution of non-linear differential equations by the method of steepest descent, by Joseph W. Fischbach. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Feb 1953. 25p diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109849

A simple and effective method is given for the numerical solution of certain types of non-linear ordinary differential equations using a gradient procedure commonly known as the method of steepest descent. The proposed method is well suited for use on a high speed digital computer. APG BRL M646.

Tables of the Bessel functions of the first kind of orders seventy-nine through one hundred thirty-

five, by the staff of the Computation Laboratory. Harvard University. Computation Laboratory. Jan 1951. 620f tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $9.00, Enlargement Print $81.25. PB 109781

Harvard University Computation Laboratory Annals, vol. 14.

Nuclear

Boron-cadmium intercalibration for pile neutrons in Gleep, an A.E.R.E. report, by F.C.W. Colmer, E. R. Wiblin and W. B. Woollen. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. May 1948. 11p graph Available from British Information Services, 30 Rockefeller Plaza, New York, 20, N. Y. $.50. PB 109802

Cover date is 1953. Revised for declassification, 19th March 1953, by E. R. Wiblin. HD. 887. S. O. code no. 674-1-38. Contents: Appendix I: Temperature of pile neutrons, by D. J. Littler. - Appendix II: Cross-section of pile, by D. J. Littler.
1. Atomic power - Research - Gt. Brit. 2. Boron-cadmium alloys - Calibration - Gt. Brit. 3. Neutrons - Interactions - Gt. Brit. 4. Atomic piles - Neutron distribution - Gt. Brit. 5. Gleep graphite swinging train (Oscillators) - Gt. Brit. 6. AERE N/R 1159 7. AERE N/M 14, Revised.

PRINTING, PUBLISHING

Analysis of page-printed teletype test copy, by Albert Silberman. U. S. Camp Coles Signal Laboratory, Fort Monmouth, N. J. Nov 1952. 12p table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110455

This memorandum considers the damage resulting to about 20,000 lines of page printed radioteletype message copy. Definitions of damaged copy appearance, of terms used in evaluating printed copy and of kinds of faulty teletype operations are included. The affect of teletypewriter operations on printed copy is tabulated. Dept. of the Army project no. 3-99-12-021. Signal Corps project no. 132A. SCEL TM M-1474.

PSYCHOLOGY

Devices for studying interference in psychomotor performance. III: Double-disk pursuit apparatus, by Don Lewis. Iowa State University, Iowa City, Iowa. n.d. 19p photos, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 108720

Three attempts were made with rotary pursuit apparatus to induce decrements in performance subsequent to interpolated practice. An ordinary Koerth-type rotor was first employed. The first model of the double-disk pursuit apparatus was next tried. A third attempt to induce decrements in performance was made with a second model of the double-disk pursuit apparatus. A new device which utilizes a double-disk rotor along with an auxiliary "wobble stick" mechanism, is being constructed. It will require the subjects, during interpolated practice, to learn to make new responses to old stimuli and thus should provide the stimulus-response relationships necessary to insure the appearance of reliable and sizable decrements in performance. Contract N5 ori-57, T. O. II, Project NR-783-002. SDC Human engineering project 20-M-1. SDC TR 57-2-13.

Methods in psychology, by J. E. Hochberg. Cornell University. Dept. of Psychology, Ithaca, N. Y. Jan 1953. 58p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 109599

Contract Nonr-401(2).
1. Psychological research.

Psychological aspects of survival, by E. Paul Torrance. U. S. Air Research and Development Command. Human Factors Operations Research Laboratories, Bolling Air Force Base, Washington, D. C. Mar 1953. 31p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109600

1. Survival 2. Survival - Bibliography 3. Psychological research 4. Psychology, Applied 5. AAF HFORL R35.

RUBBER AND RUBBER PRODUCTS

Final report to the Engineer Research and Development Laboratories under Contract no. W33-009 eng-587, Project no. 8-93-15-001, by P. E. Meiss and R. L. Knarr. Thiokol Corp., Trenton, N. J. Apr 1951. 193p photos, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $7.00, Photostat $25.00. PB 109639

The report is divided into seven parts which cover the following: organic preparations, analytical procedures, polymerization methods, compounding, experimental polymers, testing methods, and combination of "Thiokol" type polymers with other polymer types.

Low temperature performance of butyl gas masks. Standard Oil Development. Esso Laboratories. Chemical Division, Elizabeth, N. J. Sixth and final bimonthly report, by R. L. Zapp. Oct 1950. 22p photos, graphs, tables Available from Lib-

rary of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109660

Work on swollen Butyl rubber systems was continued to improve the physical properties of gas masks stocks swollen in ester-type plasticizers. It was found that slight improvement could be made in a compound containing only midly reinforcing fillers by reduction in the state of cure, but that considerable improvement could be accomplished in a fully vulcanized compound by the use of fine-particle carbon blacks. Using 50 parts of a high abrasion furnace black (Philblack 0), a vulcanizate swollen with di-octyl sebacate to a 50% plasticizer content had a tensile of nearly 1200 psi and a tear resistance of 240 lb per inch. Report no. CD-13 M-50.

Rubber compounds used in shock mounting, development of, by F. Thurman, J. Rice, P. C. Taylor. U. S. Naval Research Laboratory. Jun 1946. 14p photos, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109532

This report describes the experimental work done by the Rubber Group in making a rubber shock mounting for a Fire Alarm Thermostat. Natural and synthetic rubber of various compositions and hardness were investigated in trying to approach the optimum of the two physical characteristics needed; low spring constant and geometrical stability under impact. A mounting having nearly the optimum in the desirable characteristics was made for the Interior Communications Section. NRL P-2822.

Heat supplied to I-B-R research home from the inside chimney, by Warren S. Harris and Ross J. Martin. Illinois. Engineering Experiment Station, Urbana, Ill. Jan 1953. 47p photo, drawings, graphs, tables Available from University of Illinois, Engineering Experiment Station, Urbana, Ill. $.50. PB 109647

Report of an investigation conducted by the Engineering Experiment Station, University of Illinois, in cooperation with the Institute of Boiler and Radiation Manufacturers. University of Illinois Bulletin, vol. 50, no. 36, Jan 1953.
1. Houses - Heating - Research 2. Heat - Radiation 3. Institute of Boiler and Radiator Manufacturers 4. ILU EES B 407.

STRUCTURAL ENGINEERING

Effect of mean stress on the fatigue strength of D.T.D. 364 round bars with and without transverse holes, by G. M. Norris. Gt. Brit. Ministry of Supply. Aeronautical Research Council. May 1952. 15p photos, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 109812

Cover date is 1953. S. O. code no. 23-9007-20.
1. Steel bars - Stresses - Gt. Brit. 2. Steel bars - Fatigue - Gt. Brit. 3. Stresses - Bars - Gt. Brit. 4. ARC CP 120 5. RAE TN Struc 89.

Investigation of the performance of six small septic tanks, by E. Robert Baumann and Harold E. Babbitt. Illinois. Engineering Experiment Station, Urbana, Ill. Feb 1953. 75p photos, drawings, graphs, tables Available from University of Illinois. Engineering Experiment Station, Urbana, Ill. $.60. PB 109649

Report of an investigation conducted by the Engineering Experiment Station, University of Illinois in cooperation with the Armco Steel Corporation. University of Illinois Bulletin, vol. 50, no. 47, Feb 1953.
1. Septic tanks - Performance 2. Armco Steel Corporation, Middleton, Ohio 3. ILU EES B 409.

Strength analysis of stiffened thick beam webs with ratios of web depth to web thicknesses of approximately 60, by L. Ross Levin. U. S. National Advisory Committee for Aeronautics. May 1953. 11p photo, diagrs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109662

1. Beams, Diagonal - Tension 2. Loads, Structural - Calculation 3. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 4. NACA TN 2930.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Asymmetric tailplane loads due to sideslip, by Winfried Braun. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jan 1952. 47p drawings, diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.90. PB 109811

Cover date is 1953. S. O. code no. 23-9007-19.
1. Tail surfaces - Loads - Gt. Brit. 2. Airplanes - Sideslip - Gt. Brit. 3. Tail surfaces - Rolling moment coefficient - Gt. Brit. 4. ARC CP 119 5. RAE TN Struc 81.

Effect of curvature of surface and thickness of trailing edge on aileron hinge moments. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Oct 1942. 49p photos, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $2.85. PB 109805

Cover date is 1953. S. O. code no. 23-2506.
Contents: - Part I: Modification to aileron on upper surface, by A. S. Batson, C. H. Burge, and

J. R. Greening. - Part II: Modification to aileron on lower surface, by A. S. Batson, C. H. Burge and W. C. Skelton. - Part III: Modification to aileron on both surfaces, by A. S. Batson, C. H. Burge, and W. C. Skelton. ARC RM 2506.

Effect of ice and frost formations on drag of NACA 65_1-212 airfoil for various modes of thermal ice protection, by Vernon H. Gray and Uwe H. von Glahn. U. S. National Advisory Committee for Aeronautics. Jun 1953. 68p drawings, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109836

1. Airfoils - Drag 2. Airfoils - Ice formation 3. Airplanes - Icing prevention 4. Ice protection 5. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 6. NACA TN 2962.

Flight investigation of the effect of transient wing response on wing strains of a four-engine bomber airplane in rough air, by Harold N. Murrow and Chester B. Payne. U. S. National Advisory Committee for Aeronautics. Jun 1953. 24p diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109643

1. Gust loads 2. Wings - Stress analysis 3. Loads, Structural 4. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 5. NACA TN 2951.

Impingement of water droplets on NACA 65_1-208 and 65_1-212 airfoils at 4^0 angle of attack, by Rinaldo J. Brun, Helen M. Gallagher and Dorothea E. Vogt. U. S. National Advisory Committee for Aeronautics. May 1953. 49p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109665

1. Drops, Liquid - Impingement on airfoils 2. Trajectories, Water droplet 3. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 4. NACA TN 2952.

On the calculation of the pressure distribution on three-dimensional wings at zero incidence in incompressible flow, by O. Holme and F. Hjelte. Sweden. Kungl. Tekniska Högskolan. Institutionen för Flygteknik. Nov 1952. 28p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109610

1. Flow, Incompressible - Theory - Sweden 2. Wings, Conical - Pressure distribution - Sweden 3. Wings, Rectangular - Pressure distribution - Sweden 4. KTH AERO TN 23.

On the effect of thickness on the damping in roll of airfoils at supersonic speeds, by John C. Martin and Nathan Gerber. U. S. Aberdeen Proving Ground. Ballistic Research Laboratory, Aberdeen, Md. Jan 1953. 56p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 109845

1. Flow, Three dimensional - Theory 2. Flow, Supersonic - Theory 3. Airfoils - Thickness - Effect on damping 4. Airfoils - Damping coefficient 5. APG BRL R 843.

Revised formula for the calculation of gust loads, by Kermit G. Pratt. U. S. National Advisory Committee for Aeronautics. Jun 1953. 15p diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109838

1. Gust loads 2. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 3. NACA TN 2964.

Theoretical damping in roll and rolling moment due to differential wing incidence for slender cruciform wings and wing-body combinations, by Gaynor J. Adams and Duane W. Dugan. U. S. National Advisory Committee for Aeronautics. 1952. 13p diagrs, graphs Available from Superintendent of Documents, Government Printing Office, Washington 25, D. C. $.20. PB 109517

1. Damping derivatives - Stability 2. Rolling moments 3. Wings, Cruciform - Theory 4. Hydrodynamics - Theory 5. NACA 1088.

Theoretical estimation of power requirements for slot-suction aerofoils, with numerical results for two thick Griffith type sections, by J. H. Preston, N. Gregory and A. G. Rawcliffe. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1948. 27p diagr, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.70. PB 109806

Cover date is 1953. S. O. code no. 23-2577.
1. Airfoils, Suction - Single slot - Performance - Gt. Brit. 2. Griffith aerofoil - Gt. Brit. 3. ARC RM 2577.

Theoretical investigation of the supersonic lift and drag of thin, sweptback wings with increased sweep near the root, by Doris Cohen and Morris D. Friedman. U. S. National Advisory Committee for Aeronautics. Jun 1953. 51p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109788

1. Wings, Sweptback - Lift distribution 2. Wings, Sweptback - Drag 3. Flow, Supersonic - Theory 4. U. S. Ames Aeronautical Laboratory, Moffett Field, Calif. 5. NACA TN 2959.

Effect of number of dials on qualitative reading of a multiple dial panel, by Virginia L. Senders. Antioch College, Yellow Springs, Ohio. Nov 1952. 40p photo, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109407

Contract no. AF18 (600)-50.
1. Instruments, Aeronautical - Dials - Reading 2. Tachistoscope 3. Psychomotor tests 4. AAF WADC TR 52-182.

Effect of two instrument lighting systems on dark adaptation, by Lawrence R. Wilcox and Edward L. Cole. U. S. Air Force. Wright Air Development Center. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Dec 1952. 19p drawings, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109408

1. Instruments, Aeronautical - Lighting 2. Vision - Dark adaptation - Tests 3. Adaptometers - Design 4. AAF WADC TR 52-263.

Interim short range air navigation system, by R. A. Emmett, Jr. and R. L. Easton. U. S. Naval Research Laboratory. Jun 1946. 34p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. Limited supply available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.00. PB 109343

A navigation system is proposed which is designed to replace and improve upon the performance of the automatic radio direction finder, the omnidirectional range, the SCS-51 localizer and glide path, marker beacons, and the distance indicator. The system is to provide its functions equally well for land and carrier based aircraft. In addition, the system may be installed piecemeal without retarding completion or use of the complete system or making parts of the equipment obsolete. NRL R-2857.

Reports of research in the field of engineering psychology, by Julien M. Christensen and Harry R. Collins. U. S. Air Force. Wright Air Development Center. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Apr 1953. 28p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109409

Lists reports published by the Psychology Branch, Aero-Medical Laboratory, since its inception in 1945.
1. Instruments, Aeronautical - Research - Bibliography 2. Psychological research - Bibliography 3. AAF WADC TR 53-75.

Analysis of heat addition in a convergent-divergent nozzle, by Donald P. Hearth and Eugene Perchonok. U. S. National Advisory Committee for Aeronautics. Apr 1953. 18p diagr, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109379

1. Nozzles, Jet - Heat transference - Mathematical analysis 2. Flow, Sonic - Theory 3. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 4. NACA TN 2938.

Attenuation characteristics of four specially designed mufflers tested on a practical engine setup, by George M. Stokes and Don D. Davis, Jr. U. S. National Advisory Committee for Aeronautics. May 1953. 30p photos, diagrs, table Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109580

1. Mufflers, Exhaust - Design 2. Mufflers, Exhaust - Tests 3. Helicopters - Noise 4. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 5. NACA TN 2943.

Combustion instability in an acid-heptane rocket with a pressurized-gas propellant pumping system, by Adelbert O. Tischler and Donald R. Bellman. U. S. National Advisory Committee for Aeronautics. May 1953. 50p photo, diagrs, graph Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109377

1. Rocket motors - Combustion - Theory 2. Rocket motors - Fuel systems 3. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 4. NACA TN 2936.

Development of high temperature light weight insulating materials for jet engine tail cones, by W. F. O'Connor, T. S. Laszlo, J. R. Killelea, T. G. Bullen, N. O. Smith, M. J. McGuinness, Jr., R. Dava. Fordham University. Dept. of Chemistry, New York, N. Y. Jul 1951. 85p photos, drawings, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 109716

This report describes the second phase in the development of the materials required and is confined to fibrous materials. A gas fired catenary arch furnace for use at 1850°C was constructed. Several induction furnaces were built for melting and fiber drawing. Temperatures of 2900°C were reached. High refractory crucibles were prepared from zirconia, alumina, magnesia, other oxides, carbides, silicides and nitrides. Various mixes of possible fiber forming components were compiled. Contract AF33(038)-7371, Final report.

Development of the aircraft Diesel engine, by George W. Fosdick. Jun 1950. 81p drawings, diagr Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 109825

A statistical analysis of the aircraft Diesel engine is made, covering its development up to the point where further development became stagnant. The economical and mechanical advantages of the Diesel engine over the gasoline engine are discussed. Specifications and a description of the more important construction details are given for several German, French, British, and U. S. Diesel engines. The future trend of the Diesel engine in aviation is discussed and needed improvements are indicated. Thesis-Rensselaer Polytechnic Institute.

Fabrication of a titanium engine shroud F-84E airplane, by Norman Grossman. Republic Aviation Corp. Engineering Research Section, Farmingdale, N. Y. Aug 1951. 48p photos, drawings (part fold), tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109770

The finished product was 31% higher than the stainless steel shroud, weighing 67 lb as compared to 97 lb for the latter. The results indicate that the present annealed stainless steel shroud fabrication practice cannot be extended to the high volume production of titanium shrouds without major modifications. Drop hammering should be employed for forming all of the shroud skins, in place of the current method of rolling circumferential beads with a single pair of rollers. Contract no. AF33(038)-12938, Final report. ERS-156.

Higher harmonics of flapping on the helicopter rotor, by W. Stewart. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Mar 1952. 30p graphs, table (fold) Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 109813

Cover date is 1953. Report no. Aero. 2459. S. O. code no. 23-9007-21.
1. Harmonics - Measurement - Gt. Brit. 2. Helicopter blades - Pitch - Gt. Brit. 3. Helicopter blades - Oscillation - Gt. Brit. 4. ARC CP 121.

Internal-liquid-film-cooling experiments with airstream temperatures to 2000° F in 2- and 4-inch-diameter horizontal tubes, by George R. Kinney, Andrew E. Abramson and John L. Sloop. U. S. National Advisory Committee for Aeronautics. 1952. 23p photos, drawings, graphs, tables Available from Superintendent of Documents, Government Printing Office, Washington 25, D. C. $.25. PB 109317

1. Engines, Aircraft - Cooling 2. Rocket motors - Cooling 3. Heat - Transference - Theory 4. Reynolds number - Effect 5. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 6. NACA 1087.

Luftzumischung zu abgasstrahlen (Air admixture to exhaust jets), by E. Sänger. Translated by Mary L. Mahler. Jul 1953. 35p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110456

Translated from Ingenieur-Archiv, vol. 18, 1950 p. 310-323.
1. Jet engines - Thrust - Germany 2. Jet engines, Pulse jet - Aerothermodynamics - Germany 3. Jet engines, Ram jet - Aerothermodynamics - Germany 4. Jet engines, Turbo-jet - Aerothermodynamics - Germany 5. Rocket motors - Aerothermodynamics - Germany 6. U. S. National Advisory Committee for Aeronautics 7. NACA TM 1357.

Optimum controllers for linear closed-loop systems, by Aaron S. Boksenbom, David Novik and Herbert Heppler. U. S. National Advisory Committee for Aeronautics. Apr 1953. 27p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109380

1. Jet engines, Turbo-jet - Controls 2. Equations, Integral 3. Controllers - Theory 4. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 5. NACA TN 2939.

Propeller-noise charts for transport airplanes, by Harvey H. Hubbard. U. S. National Advisory Committee for Aeronautics. Jun 1953. 47p photos, diagr, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109839

1. Airplanes, Transport - Noise 2. Noise, Propeller - Airplanes 3. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 4. NACA TN 2968.

Propeller-performance charts for transport airplanes, by Jean Gilman, Jr. U. S. National Advisory Committee for Aeronautics. Jul 1953. 70p graphs, table Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110458

1. Propellers - Performance 2. Noise, Propeller 3. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 4. NACA TN 2966.

Subsonic flow of air through a single-stage and a seven-stage compressor, by Chung-Hua Wu. U.S. National Advisory Committee for Aeronautics. Jun 1953. 32p diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109710

1. Flow, Subsonic - Theory 2. Compressor, Axial - Blades - Flow - Calculation 3. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 4. NACA TN 2961.

Training and Training Devices

Development and tryout of objective check flights in pre-solo and basic instrument stages of naval air training, by Hardy C. Wilcoxon, Woodbury Johnson, David L. Golan. U. S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Florida, and the Psychological Corporation, New York, New York. Jul 1952. 157p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $6.00, Photostat $20.00. PB 109348

Objective check flight booklets were developed and tried out in the presolo and basic instrument stages. Reliability coefficients were computed from successive independent check rides on 100 students graded by the existing check flight forms, and 100 students graded by the experimental check flight forms. No increase in ride-ride reliability of the check flights was found through objective grading of the standard check flight content. Joint project report no. NM 001 058.24.01. Accompanied by Instructor's manual for objective-type check flights; Basic instrument check objective-type experimental form; objective-type grading A-19 check flight.

Aerodynamics

Aerodynamic forces on biconvex aerofoils oscillating in a supersonic airstream, by W. P. Jones and Sylvia W. Skan. Effect of thickness on the aerodynamic forces on biconvex aerofoils oscillating in a supersonic airstream, and calculation of forces for aerofoil with flap, by Sylvia W. Skan. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Aug 1951. 34p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $2.00. PB 109807

1. Airfoils, Biconvex - Oscillations - Gt. Brit. 2. Flow, Supersonic - Theory - Gt. Brit. 3. Flaps, Aircraft - Leading edges - Gt. Brit. 4. Wing flaps - Leading edges - Gt. Brit. 5. ARC RM 2749.

Aerodynamic forces on oscillating low aspect ratio wings in compressible flow, by H. Merbt and M. Landahl. Sweden. Kungl. Tekniska Högskolan. Institutionen för Flygteknik. Jan 1953. 20p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109611

Slightly revised translation of KTH Aero FL 136, dated 16-6-52.
1. Flow, Compressible - Theory - Sweden 2. Wings, Triangular - Aerodynamics - Sweden 3. Wings, Triangular - Aspect ratio - Sweden 4. Mathieu functions (Aerodynamics) 5. KTH AERO TN 30.

Analysis of the factors affecting the loss in lift and shift in aerodynamic center produced by the distortion of a swept wing under aerodynamic load, by Charles W. Mathews and Max C. Kurbjun. U. S. National Advisory Committee for Aeronautics. Mar 1953. 65p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 108787

1. Wing theory 2. Wings, Swept - Aspect ratio 3. Wings, Swept - Taper ratio 4. Wings, Swept - Deformation 5. Stability, Longitudinal - Static tests 6. Aeroelasticity - Calculations 7. Loads, Aerodynamic - Elasticity 8. Airplanes - Lift 9. Lift distribution - Measurements 10. NACA TN 2901.

Approximate method of calculating the subsonic velocity distribution on high-aspect-ratio swept wings of small thickness at zero lift, by Frederich Kaune. Sweden. Kungl. Tekniska Högskolan. Institutionen för Flygteknik. Feb 1953. 36p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109927

1. Wings, Swept - Aspect ratio - Sweden 2. Wings, Swept - Velocity distribution - Sweden 3. Mach number - Effect - Sweden. 4. KTH AERO TN 26.

Cabin-air moisture removal, by George A. Dalin, M. U. Cohen, Alfred Schneider. Balco Research Laboratories, Newark, N. J. Jun 1951. 183p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $6.75, Photostat $23.75. PB 110492

A review of all moisture removal methods is presented with an analysis of their applicability to the problem of decreasing the heating load on equipment used for preventing condensation of moisture on aircraft cabin transparent areas. Ambient altitude, ambient temperature, cabin altitude, cabin occupancy rate and the rate of air input are correlated to determine the load imposed on dehumidifying equipment. Tentative design and operating specifications for a continuous rotary bed silica gel dryer and for a modified air cycle refrigeration system are presented. Test equipment and a test procedure for verifying the predicted results experimentally are described, and the results obtained are presented. Contract no. AF33(038)-11817. AAF TR 5887.

Condensation line of air and the heats of vaporization of oxygen and nitrogen, by George T. Furukawa and Robert E. McCoskey. U. S. National Advisory Committee for Aeronautics. Jun 1953. 30p graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109789

1. Wind tunnels, Hypersonic - Condensation of air 2. Air - Condensation 3. Oxygen, Liquid - Vaporization 4. Nitrogen, Liquid - Vaporisation 5. U. S. National Bureau of Standards 6. NACA TN 2969.

Design of variable Mach number asymmetric supersonic nozzles by two procedures employing inclined and curved sonic lines, by Clarence A. Syvertson and Raymond C. Savin. U. S. National Advisory Committee for Aeronautics. Mar 1953. 35p diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 108969

1. Flow, Compressible - Theory 2. Wind tunnels - Nozzles, Asymmetric - Design 3. Mach number - Effect 4. Prandtl-Mayer theory (Aerodynamics) 5. NACA TN 2922.

Development of turbulence-measuring equipment, by Leslie S. G. Kovasznay. U. S. National Advisory Committee for Aeronautics. Jan 1953. 86p photos, diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 108602

1. Turbulence - Measurements 2. Velocity, Supersonic - Measurement 3. Flow, Compressible - Theory 4. Aerodynamics - Research 5. U. S. National Bureau of Standards 6. NBS 1286 7. NACA TN 2839.

Discussion of boundary-layer characteristics near the wall of an axial-flow compressors, by Artur Mager, John J. Mahoney and Ray E. Budinger. U. S. National Advisory Committee for Aeronautics. 1952. 22p photo, diagrs, graphs, tables Available from Superintendent of Documents, Government Printing Office, Washington 25, D. C. $.25. PB 109354

1. Flow, Viscous - Theory 2. Boundary layer - Theory 3. Compressors, Axial - Blades - Flow 4. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 5. NACA 1085.

Effect of horizontal-tail span and vertical location on the aerodynamic characteristics of an unswept tail assembly in sideslip, by Donald R. Riley. U. S. National Advisory Committee for Aeronautics. Feb 1953. 39p photos, diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 108790

1. Tail design, Aircraft - Stabilizing effect 2. Stabilizers, Vertical - Effects 3. Stabilizers, Vertical - Design 4. Stabilizers, Vertical - Wind tunnel tests 5. Airplanes - Sideslip 6. Stability, Lateral - Static tests 7. Tail surfaces - Loads 8. NACA TN 2907.

Effect of thermal properties on laminar-boundary-layer characteristics, by E. B. Klunker and F. Edward McLean. U. S. National Advisory Committee for Aeronautics. Mar 1953. 29p graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 108967

1. Flow, Supersonic - Theory 2. Flow, Laminar - Theory 3. Heat - Transference - Theory 4. Boundary layer, Laminar - Thermodynamics 5. Mach number - Effect 6. Prandtl number 7. NACA TN 2916.

Effect of variable viscosity and thermal conductivity on high-speed slip flow between concentric cylinders, by T. C. Lin and R. E. Street. U. S. National Advisory Committee for Aeronautics. Feb 1953. 122p diagr, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 108902

1. Flow, Slip - Theory 2. Flow, Viscous - Coefficients 3. Dynamics, Gas - Theory 4. Heat - Transference - Aerodynamics 5. Washington. University. Aeronautical Laboratory, Seattle, Washington 6. NACA TN 2895.

Estimation of hydrodynamic impact loads and pressure distributions on bodies approximating elliptical cylinders with special reference to water landings of helicopters, by Emanuel Schnitzer and Melvin E. Hathaway. U. S. National Advisory Committee for Aeronautics. Apr 1953. 31p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109349

1. Seaplanes - Hulls - Dead rise 2. Seaplanes - Impact pressures 3. Helicopters - Landing, Water 4. Loads, Landing - Impact 5. Hydrodynamics - Theory 6. Cylinders, Elliptic - Pressure distribution 7. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 8. NACA TN 2889.

Exakte lösungen für die laminare grenzschicht mit absaugung und ausblasen (Exact methods for calculating laminar boundary layer control), by Hermann Schlichting and Karl Bussmann. 1943. 74p graphs, tables (Text in German and English) Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.50, Photostat $10.00. PB 108629

Schriften der Deutschen Akademie der Luftfahrtforschung band 7B, hft. 2. ZWB/DAL/Re/7B/2-43. ZWB 10362.
1. Boundary layer, Laminar - Theory - Germany 2. Equations, Differential 3. Deutsche Akademie der Luftfahrtforschung, Berlin 4. AAF TR 2473.

Experiments on mixed-free-and-forced-convective heat transfer connected with turbulent flow through a short tube, by E.R.G. Eckert, Anthony J. Diaguila and Arthur N. Curren. U. S. National Advisory Committee for Aeronautics. Jul 1953. 59p photo, diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110462

1. Heat - Transference - Aerodynamics 2. Flow, Turbulent 3. Reynolds number - Effect 4. Grashof number - Effect 5. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 6. NACA TN 2974.

Factors affecting laminar boundary layer measurements in a supersonic stream, by Robert E. Blue and George M. Low. U. S. National Advisory Committee for Aeronautics. Feb 1953. 49p diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 108781

Appendix A: Symbols. - Appendix B: Reduction of data, by Jack M. Lande.
1. Flow, Supersonic - Measurements 2. Flow, Laminar - Measurements 3. Boundary layer, Laminar - Measurements 4. Wings - Boundary layer - Measurements 5. NACA TN 2891.

Hydrodynamic impact of a system with a single elastic mode. I: Theory and generalized solution with an application to an elastic airframe, by Wilbur L. Mayo. U. S. National Advisory Committee for Aeronautics. 1952. 19p diagrs, graphs, table Available from Superintendent of Documents, Government Printing Office, Washington 25, D. C. PB 109692

1. Floats - Hydrodynamics 2. Floats - Landing 3. Impact loading 4. Loads, Landing - Impact 5. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 6. NACA TN 1074.

Impingement of cloud droplets on aerodynamic bodies as affected by compressibility of air flow around the body, by Rinaldo J. Brun, John S. Serafini and Helen M. Gallagher. U. S. National Advisory Committee for Aeronautics. Mar 1953. 20p diagrs, graphs, table Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 108789

1. Flow, Incompressible - Theory 2. Flow, Subsonic - Theory 3. Wings - Ice formation 4. Ice formation - Meteorological analysis 5. Propellers - Ice prevention 6. Tail surfaces - Ice formation 7. Clouds - Water content 8. Raindrops - Impingement on airfoils 9. Trajectories, Water droplet 10. Mach number - Effect 11. Cylinders, Rotating - Ice accretion 12. Atmosphere - Moisture content - Tests 13. Atmosphere - Turbulence - Meteorological aspects 14. Meteorology, Aeronautical 15. NACA TN 2903.

Interaction between a supersonic stream and a parallel subsonic stream bounded by fluid at rest, by Herbert S. Ribner and E. Leonard Arnoff. U. S. National Advisory Committee for Aeronautics. Dec 1952. 45p diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 108272

1. Flow, Subsonic - Theory 2. Flow, Supersonic - Theory 3. Flow, Laminar - Theory 4. Flow, Turbulent - Theory 5. Boundary layer - Interactions 6. Wings - Boundary layer 7. NACA TN 2860.

Investigation of the experimental aerodynamic loading on a model helicopter rotor blade, by John R. Meyer, Jr. and Gaetano Falabella, Jr. U. S. National Advisory Committee for Aeronautics. May 1953. 110p photos, diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109666

1. Helicopter blades - Pressure distribution 2. Massachusetts Institute of Technology, Cambridge, Mass. 3. NACA TN 2953.

Modified Reynolds analogy for the compressible turbulent boundary layer on a flat plate, by Morris W. Rubesin. U. S. National Advisory Committee for Aeronautics. Mar 1953. 23p graphs, table Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109105

1. Reynolds number - Effect 2. Boundary layer, Turbulent - Flow 3. Heat - Transference - Aerodynamics 4. Plates, Flat - Boundary layer 5. NACA TN 2917.

New shadowgraph technique for observation of conical flow phenomena in supersonic flow and preliminary results obtained for a triangular wing, by Eugene S. Love and Carl E. Grigsby. U. S. National Advisory Committee for Aeronautics. May 1953. 16p photos, diagrs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109583

1. Photography, Shadow 2. Flow, Supersonic 3. Flow - Photography 4. NACA TN 2950.

Symmetric laminar mixing of two parallel streams, by Paul Torda. Illinois. University. Dept. of Aeronautical Engineering, Urbana, Ill. Oct 1951. 29p diagr, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109720

The analysis of laminar symmetric mixing of two parallel streams is presented. The effect of the upstream velocity distribution of the streams on the mixing process is taken into account. The von Karman integral concept is used to evaluate the thickness of the mixing zone and the velocity distribution in it. The results are presented in non-dimensional form. A numerical illustrative example is given. Contract no. AF33(038)-21251. Technical report M-T-1. Theoretical studies of the mixing process of a jet impinging into a stream of large mass.

Theoretical pressure distributions and wave drags for conical boattails, by John R. Jack. U. S. National Advisory Committee for Aeronautics. Jul 1953. 14p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110460

1. Loads, Aerodynamic 2. Mach number - Effect 3. Afterbodies - Pressure distribution - Theory 4. Afterbodies - Drag - Theory 5. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 6. NACA TN 2972.

NATIONAL SCIENCE FOUNDATION

Russian Translations

The following translations prepared by Columbia University and printed by the Atomic Energy Commission are available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., at the prices quoted.

TR15 "Resistance to Abrasive Wear and the Hardness of Metals", by M. M. Khrushchov and M. A. Babichev. 4p. 10¢.

TR16 "Certain Regularities in Nuclear Spin and a Nuclear Shell Model", by I. A. Vaisman. 8p. 20¢.

TR17 "Motion of a Sphere in a Visco-Plastic Liquid Dispersion System", by N. V. Tyabin. 5p. 10¢.

TR18 "An Estimate of Displacements and Deformations of Underground Gas Conduits Due to Temperature", by K. S. Zarembo. 4p. 10¢.

TR19 "On a "New" Mechanism of Plasticity of Metallic Solid Solutions", by K. A. Osipov, S. G. Fedotov and M. G. Lozinsky. 5p. 10¢.

TR20 "Wide-Angle Interference From a Quadrupole Source of Light", by M. V. Fok. 5p. 10¢.

TR21 "Variational Principles and the Virial Theorem in Problems of Continuous Spectra in Quantum Mechanics", by Yu. N. Demkov. 4p. 10¢.

TR22 "A Study of Reduction by Roller Mills", by S. D. Khusid. 4p. 10¢.

TR23 "The Effect of the Stimulating Action of the Exciting Light on Phosphorescence", by L. I. Anikina. 4p. 10¢.

TR24 "On the Theory of Decomposition of Supersaturated Solutions, by I. V. Salli. 4p. 10¢.

TR25 "The Dependence of the Diffusion Coefficient on Atomic Interaction in Metals and Alloys", by I. Ya. Dekhtyar. 4p. 10¢.

TR26 "Equations of Motion and Field Equations in the Five-Dimensional Unitary Theory of Relativity", by R. S. Ingarden. 5p. 10¢.